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SOUTHERN MEDICAL ASSOCIATION, Twenty-Seventh Annual Meeting, RICHMOND, VIRGINIA, November 14-17, and a post-meeting day in Washington, November 18

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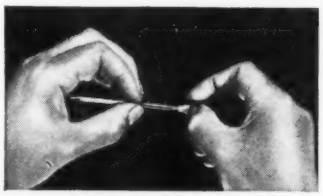

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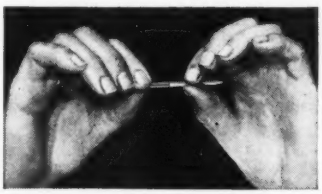

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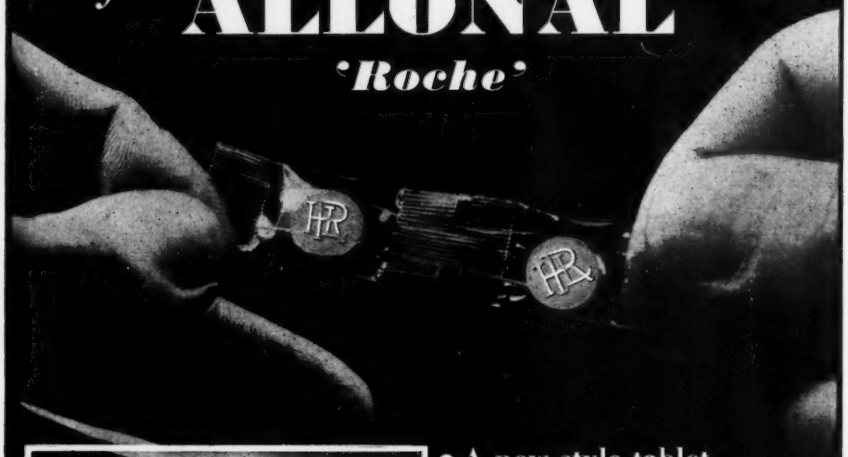

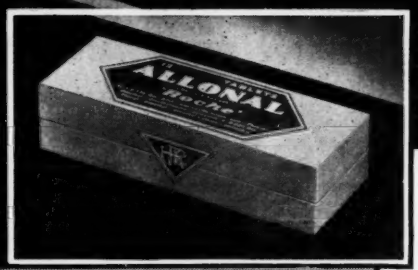

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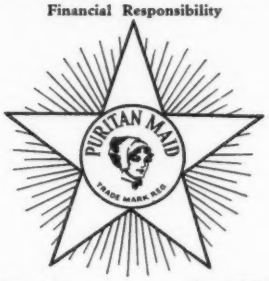

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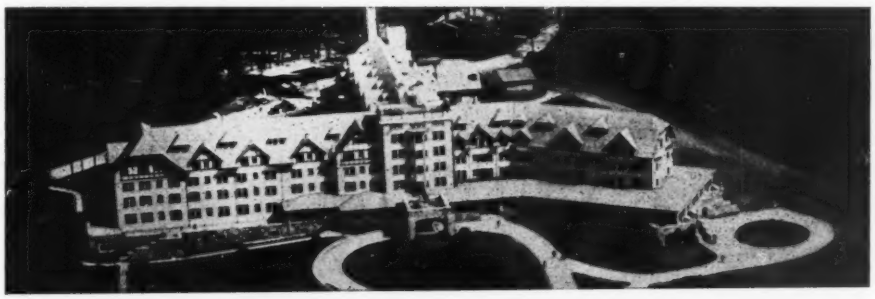

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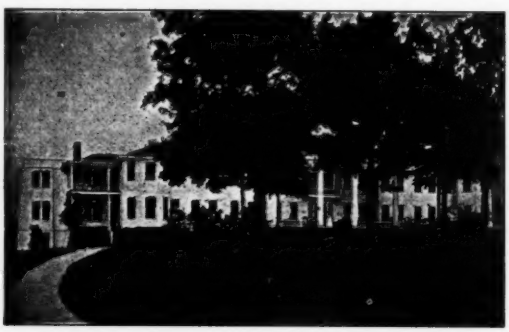

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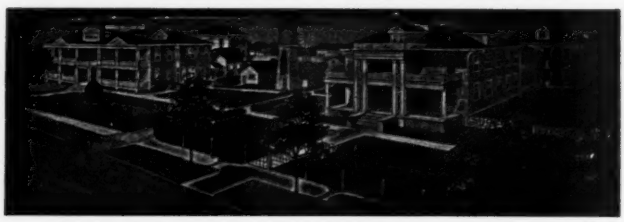

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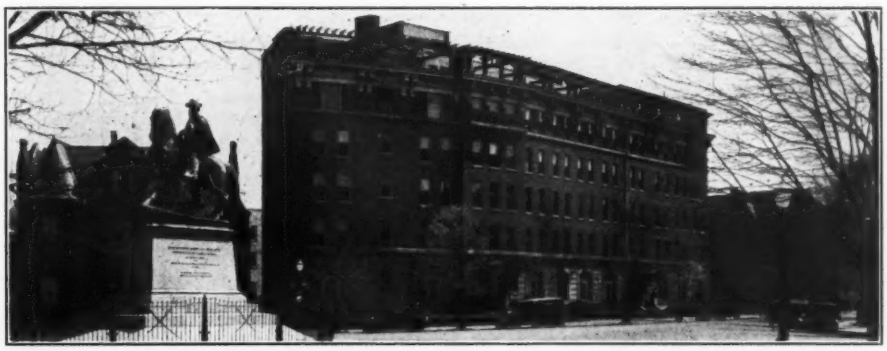

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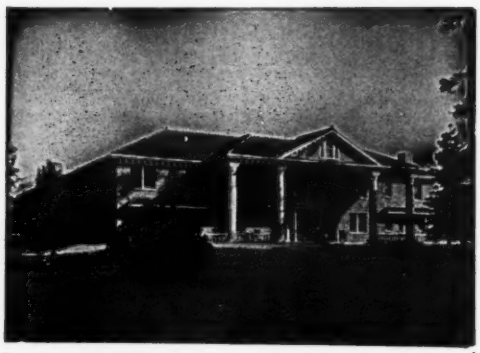

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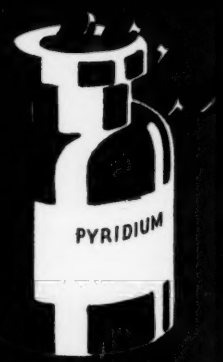

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THE TREATMENT OF HOOKWORM AND OTHER INTESTINAL HELMINTH INFECTIONS WITH HEXYLRESORCINOL UNDER FIELD CONDITIONS IN CENTRAL AMERICA*

A PRELIMINARY REPORT

By DANIEL M. MOLLOY, M.D.,
San José, Costa Rica

Hexylresorcinol was introduced as an ascaricide by Lamson, Ward and Brown[1] in 1930. These preliminary investigations were later repeated by Lamson, Caldwell, Brown and Ward.[2] In a later communication, Lamson, Brown, Robbins and Ward reported the results of treatment of hookworm disease with hexylresorcinol, and, still later, they reported on the results of treatment of the three common intestinal helminth infections (hookworm, ascaris and trichuris) with hexylresorcinol under field conditions.[3,4] Lamson and Ward reviewed the whole subject of the chemotherapy of helminth infestations in an extensive paper published early in 1932.[5] In this paper the chemical properties and pharmacology of hexylresorcinol were fully described, and it will not be necessary to repeat this discussion.

The investigations reported in this paper were conducted for the purpose of determining the effect of hexylresorcinol on hookworm infestations when administered under field conditions in Central America, where moderately severe and (less frequently, now that the results of the campaigns of soil sanitation are beginning to manifest themselves), severe hookworm infestations are easily found. Incidentally, its effect on other secondary helminth infestations (ascaris and trichuris) was also recorded and will be reported in this paper.

I wish to acknowledge and express my thanks for the valuable assistance rendered in these investigations by Señor Rómulo Roux, assistant director and chief of the hookworm control service of the national health department of the Republic of Panama, under whose personal direction the investigations in the Republic of Panama were carried out. Two members of the personnel of the hookworm service of the national health department of the Republic of Guatemala (Srs. Castaños and Dueñas) also rendered technical assistance, under the personal direction of the writer, and acknowledgment is hereby made of their services. I also wish to acknowledge the assistance lent by the staff of the United Fruit Company Hospital at Quiriguá, Guatemala; the Superintendent of this Hospital, Dr. N. P. Macphail, placed the facilities of the Hospital laboratory at the disposal of my assistants and personally assisted by making the arrangements for carrying out the investigations on the United Fruit Company's farms.

Methods Employed.—Hexylresorcinol was administered in gelatin capsules at the beginning of the investigations, but capsules were found to be impracticable. Hexylresorcinol reacts on the gelatin of capsules in the presence of heat and moisture[5] and the capsules were soon rendered unfit for use by the hot, humid climate of the coastal plains, where most of the work was carried out. Later, chocolate colored sugar coated pills were supplied by Sharp & Dohme. These pills were found to be fairly stable and apparently give as good results as freshly filled capsules, as will be seen further along in the report. Little difficulty was encountered in administering hexylresorcinol in pill form, except in the treatment of very young children. The technicians who administered the treatments had had a very large experience in administering anthelmintics by almost all known methods and were able to overcome most of the difficulties in connection with the administration of the drug in pill form. Occasionally a pill was broken in the act of swallowing, or chewed by ignorant individuals and very young children. Lamson

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*The studies and observations on which this paper is based were conducted with the support and under the auspices of the International Health Division of the Rockefeller Foundation.

calls attention to the local action of hexylresorcinol on the mucous membrane of the mouth and tongue.[5] In our cases, chewing of the capsules or pills caused a tingling sensation, followed by numbness of the tongue and a blanching of the buccal mucous membrane. In one or two cases peeling of shreds of the superficial epithelial layers was noted later. This action was entirely superficial, however, and its effects rapidly disappeared.

No evidences of intoxication were observed after treatment. Symptoms of a slight gastric irritation were noted in a few instances, but this rarely resulted in nausea and vomiting, common after the administration of the anthelmintics formerly employed. Some evidence of intestinal irritation was present in a few cases, but rapidly disappeared. Headache and dizziness were occasionally complained of, but these were attributed to "fasting" (*ayunas*) by the patients themselves.

The dose varied from 0.40 gram for very young children to 1.05 gram for individuals 12 years of age and above. The drug was administered on an empty stomach early in the morning and no food was allowed for five hours following its administration. Patients were given no preliminary preparation other than advising them to take a rather light meal the evening before treatment. No preliminary purge was given, although it was felt that such a purge would probably increase the anthelmintic effect of the drug by clearing the alimentary canal of extraneous matter so that the drug might come in more intimate contact with the parasites. The diet of the average Central American Indian or Mestizo is such as to leave a large residue of undigested food in the intestines (particularly undigested *frijoles*) and constipation is the rule. A preliminary purge would undoubtedly be advantageous, but under field conditions it is extremely difficult to obtain the cooperation of patients to the extent that they will submit to the discomforts and inconveniences occasioned by a preliminary purge. In private practice this would not be the case, and I should recommend a more thorough preliminary preparation in the treatment of patients in institutions or private practice.

In most cases a saline cathartic was administered twenty-four hours after the anthelmintic; in one series, a purge was administered two hours after the drug, following the method used in treatments with oil of chenopodium, thymol or carbon tetrachloride. Sodium sulphate was used as a purgative in Guatemala and magnesium sulphate in Panama. Our experience confirms Lamson's conclusion that "It is probable that many patients have died from over-purgation (or from the toxic effect of the purgative) in case of collapse from a toxic vermifuge."[4] In fact, the experience of years has convinced the writer that a large number of the "accidents" following the administration of anthelmintics in mass-treatment campaigns are due to the absorption of magnesium sulphate, administered in large doses in concentrated solution, and not to the toxic effects of the anthelmintics used.

At the suggestion of Dr. Lamson,[6] phenolphthalein was used as a purgative in one series of treatments, administered simultaneously with hexylresorcinol. The dose varied from 1 to 3 grains, according to age. This dose of phenolphthalein produces mild purgation in from eight to twelve hours, the average being about ten hours. The results of this procedure were similar to those which were obtained by administering sodium sulphate twenty-four hours after the treatment, as will be seen from the tabulation of the results of treatments given further on in this report. No idiosyncrasies to phenolphthalein (pigmentation of the skin, and so forth), were observed in this series.[6] The administration of the purgative simultaneously with the anthelmintic possesses decided advantages, as all field workers will appreciate. In some cases, phenolphthalein failed to produce purgation within twenty-four hours; these patients were given a purgative of sodium or magnesium sulphate the following morning.

The results reported are based on data obtained by the examination of fecal specimens by the Stoll method before and after treatment.[7 8] While some doubt has been cast on the accuracy of this method in estimating the number of hookworm harbored,[9] we believe, with Hill, that there is a "general relation between total egg-outputs and the number of worms, when the number of parasites harbored by a sufficiently large group is concerned"[10] and hold, with Chopra and Chandler,[11] that a differential egg count before and after treatment is one of the most efficient and certainly the most practicable means of determining the efficacy of anthelmintic treatment.

Hexylresorcinol in the Treatment of Hookworm Infestations.—The experiments reported in this paper were conducted primarily for the purpose of determining the effect of hexylresorcinol on hookworm disease. Lamson and his col-

laborators had found that hexylresorcinol brought about a reduction of from 80 to 90 per cent in the hookworm infestations treated in schools during the course of their ascaris studies.[3 4] These treatments were incidental to the other work; in our experiments, all treatments were directed against hookworms, all individuals treated being infected with this parasite. A large percentage of these individuals harbored either ascaris or trichuris, or both. The effect of hexylresorcinol on these infections will also be reported. While a number of treatments were administered in schools, most of our experiments were carried out in temporary hookworm dispensaries in which routine hookworm work was under way. Some treatments were administered on coffee *fincas*, but most of the work was done in hookworm posts established in villages and towns, the inhabitants of the surrounding rural communities being attended in these central dispensaries.

All treatments were administered personally by the technicians in these dispensaries, this being the procedure which has been followed in all hookworm work in these countries for some years. All patients were instructed to come to the dispensary without having taken any food and if any one admitted having eaten before arriving for treatment, he or she was excluded from the group to be treated that day. In most cases the entire group remained in the dispensary for four or five hours after the treatment was administered, this being the routine followed in practically all hookworm treatments. When allowed to go home before the necessary time had elapsed, a certain number partook of some food, with a consequent diminution in the anthelmintic effect of the drug. In practically all cases that showed little or no diminution in the egg count after treatment, it was possible to obtain a history of having eaten before coming to the dispensary for receiving treatment, or soon after the drug was administered. These cases have not been excluded in tabulating the results of treatment, since it was our purpose to determine, in so far as possible, the results which might be obtained by administering the drug under customary field conditions.

Hexylresorcinol in Capsules. — As already stated, hexylresorcinol was administered in gelatin capsules at the outset. In most cases a purgative of sodium sulphate was administered 24 hours later. A purgative was administered two hours after the drug in a small series, following the routine employed in all hookworm treatments. The results of these treatments are given in the following table:

Table 1

Hookworm.—The effect of hexylresorcinol in capsules (dose 0.40 to 1.00 gram), followed by a purgative of sodium sulphate in two hours. (Finca "Santa Anita," Guatemala.)

Number of cases	91
Egg count per c. c. (formed basis)	
Before treatment	438,800
After treatment	147,800
Per cent reduction	68.59
Per cent cured	30

Most of the individuals of this group harbored very light infections, 22 having egg counts of less than 1,000 per c. c. This will probably account for the fairly high percentage of cures; practically all of the cures occurred in individuals having egg counts of less than 1,500. It will be noted that the effect on hookworms, as shown by the reduction in the total egg count, was slightly less favorable than when the purgative was administered twenty-four hours later. Another series of treatments of hexylresorcinol in capsules was administered, the anthelmintic being followed by a purgative 24 hours later. *Table 2* shows that the administration of the purge the following day increased the anthelmintic effect of the drug. This is particularly true of ascaris, as will be shown later.

Table 2

Hookworm.—The effect of hexylresorcinol in capsules (dose 0.40 to 1.00 gram), followed by a purgative of sodium sulphate in 24 hours. (La Democracia and Retalhuleu, Guatemala.)

Number of cases	111
Egg count per c. c. (formed basis)	
Before treatment	1,630,000
After treatment	370,700
Per cent reduction	76.76
Per cent cured	13

On account of the deterioration of capsules already referred to, pills containing 0.15 gram of hexylresorcinol were later furnished us by the manufacturers. These pills were easily administered, even to young children. The first series of treatments given in this form is reported in *Table 3.*

Table 3

Hookworm.—The effect of hexylresorcinol in pills of 0.15 gram (dose 0.45 to 1.05 gram), followed by a purgative of sodium sulphate in 24 hours. (La Democracia, Guatemala.)

Number of cases	101
Egg count per c. c. (formed basis)	
Before treatment	1,143,900
After treatment	304,300
Per cent reduction	73.39
Per cent cured	11

The amount of hexylresorcinol in each pill was later increased to 0.20 gram. It proved slightly more difficult to administer pills of this size to very young children; in addition, they admit of

less flexibility in the dosage intervals. This may account for the slightly less favorable results obtained in the series reported in *Table 4*.

Table 4

Hookworm.—The effect of hexylresorcinol in pills of 0.20 gram (dose 0.40 to 1.00 gram), followed by purgative of sodium sulphate in 24 hours. (Retalhuleu, Guatemala.)

Number of cases	48
Egg count per c. c. (formed basis)	
Before treatment	904,200
After treatment	316,200
Per cent reduction	65.03
Per cent cured	5

In the experiments conducted in the Republic of Panama, magnesium sulphate was used as a purgative. While sodium sulphate is undoubtedly preferable as a purgative, the substitution of the magnesium salt for the sodium salt seems to affect the final results very little, as demonstrated in *Table 5*.

Table 5

Hookworm.—Effect of hexylresorcinol in pills of 0.20 gram (dose 0.40 to 1 gram), followed by a purgative of magnesium sulphate in 24 hours. (Panama.)

Number of cases	360
Egg count per c. c. (formed basis)	
Before treatment	4,825,600
After treatment	1,535,300
Per cent reduction	68.18
Per cent cured	2

Hexylresorcinol Administered with Phenolphthalein.—Reference has already been made to phenolphthalein as a purgative. This drug was administered simultaneously with hexylresorcinol in one series of treatments. Reference to *Table 6* will show that the administration of phenolphthalein simultaneously with the hexylresorcinol did not reduce its anthelmintic efficiency, as did the administration of magnesium sulphate two hours later. This was probably due to the fact that phenolphthalein does not as a rule produce purgation until eight to twelve hours after administration (in our series the average was about ten hours). This leaves the drug in contact with the parasites a sufficiently long time to allow it to exert its maximum effect. In about 25 per cent of the cases the drug did not produce purgation on the day of treatment. These patients were given a light dose of magnesium or sodium sulphate the next morning.

Table 6

Hookworm.—Effect of hexylresorcinol in pills of 0.20 gram (dose 0.40 to 1.00 gram), administered simultaneously with phenolphthalein (dose 1 to 3 grains). (Quirigua and Los Amates, Guatemala.)

Number of cases	126
Egg count per c. c. (formed basis)	
Before treatment	1,556,700
After treatment	423,100
Per cent reduction	72.81
Per cent cured	4

Most of the patients to whom phenolphthalein was administered expressed preference for this form of purgative. It produced little discomfort, allowing the patient to go about his work in the customary manner. It also saves time for the technicians who administer treatments. Since no idiosyncrasies to the drug were noted[6] (and, mainly, because of the ease with which it may be administered, even to very young children) the members of the field staffs of the hookworm services of both Panama and Guatemala express their preference for phenolphthalein as a purgative.

The Effect of Two Doses of Hexylresorcinol on Hookworms.—A second dose of hexylresorcinol was administered to 289 individuals who had been given a single dose and egg-counted again two weeks later. This second dose was administered in exactly the same manner as the first, both treatments being followed by a purgative of magnesium sulphate in twenty-four hours.

Table 7

Hookworm.—Effect of two treatments of hexylresorcinol in pills of 0.20 gram (dose 0.40 to 1.00 gram), interval of two weeks between treatments; both treatments followed by purgative of magnesium sulphate in 24 hours. (Canasillas, Guayaquil and Martincito, Panama.)

Number of cases	289
Egg count per c. c. (formed basis)	
Before treatment	3,830,100
After treatment	457,500
Per cent reduction	88.05
Per cent cured	25

It was thought that two treatments of hexylresorcinol given at shorter intervals might increase the anthelmintic effect of the drug through cumulative action. A series of treatments was given, administering the usual dose of hexylresorcinol on two consecutive days, the second treatment only being administered simultaneously with phenolphthalein. The results obtained with these two treatments differ very little from those which were obtained with two treatments given at two weeks' intervals, as the following table will show:

Table 8

Hookworm.—The effect of two treatments of hexylresorcinol (dose 0.40 to 1.00 gram, in pill form), administered on two consecutive days, the second dose being administered simultaneously with phenolphthalein (dose 1 to 3 grains). (La Pena, Panama.)

Number of cases	329
Egg count per c. c. (formed basis)	
Before treatment	7,225,750
After treatment	905,850
Per cent reduction	87.4
Per cent cured	14

Contrary to the opinions expressed by Lamson and his co-workers,[4] the administration of a second treatment of hexylresorcinol materially

increased the percentage reduction in the egg count, as well as the percentage of cures. Giving the entire treatment on two consecutive days possesses decided advantages over administering the second dose after the lapse of a longer interval, since it is easier to get patients to return for a second treatment the following day than a week or two later, when they have returned to their customary occupations and lost most of the enthusiasm for "getting cured," provided, of course, that the administration of treatments on two consecutive days does not entail too much discomfort from fasting and the drug administered does not produce unpleasant effects. In this series the administration of a second full dose of the drug after an interval of twenty-four hours did not seem materially to increase the slight discomfort produced in a few cases by the first dose, and no toxic symptoms whatsoever were noted after the administration of the second dose.

Comparison with Other Anthelmintics.—It is difficult to compare the results obtained with hexylresorcinol in the treatment of hookworm disease with those obtained with other anthelmintics by other workers because of the different criteria adopted by other workers in determining the results of treatment, as well as the methods of reporting their results. Darling reported a 95 per cent efficiency in the use of thymol under carefully controlled hospital conditions. These results were based on worm counts.[12] Soper[13] and Kendrick[14] reported a 93.6 per cent and 96.5 per cent efficiency, respectively, from carbon tetrachloride, administered under similar conditions, their results also being based on worm counts. Results with chenopodium varying in efficiency from 47 to 95 per cent efficiency from chenopodium have been reported, these results varying in direct proportion to the size of the dose.[15 12] Schapiro and Stoll obtained a 93 per cent efficiency with doses of 3.00 c. c. of tetrachlorethylene under hospital conditions and 81 per cent under field conditions, basing their results on egg counts before and after treatment.[15] Kendrick reports an efficiency of 89.8 per cent with 3.00 c. c. of the same drug, administered to carefully controlled patients in a penal institution. These results were based on worm counts.[14] Hall and Augustine report an efficiency of 87.6 per cent with similar doses of the drug administered to soldiers under carefully controlled conditions, basing their results on both worm and egg counts.[16] We have been able to make a direct comparison between the results obtained from a single treatment of hexylresorcinol and those obtained from single treatments of only two of the other anthelmintics mentioned, chenopodium and tetrachlorethylene.

Effects of One Treatment of Chenopodium.—Chenopodium has been used exclusively in the treatment of hookworm disease for more than ten years in the Republic of Panama. The effect of one dose of this drug on 212 persons, as indicated by egg counts made before treatment and two weeks after treatment, is shown in *Table 9*.

Table 9

Hookworm.—Results of a single treatment of oil of chenopodium (dose 0.2 to 1.50 c. c., administered in a single dose in magnesium sulphate solution).

Number of cases	212
Egg count per c. c. (formed basis)	
Before treatment	4,975,200
After treatment	2,474,800
Per cent reduction	50.3
Per cent cured	0

At my suggestion, the treatment of chenopodium was administered in two equal doses, with an hour's interval between the first and second dose, this last dose being followed in one hour with a purgative of magnesium sulphate. As will be seen from *Table 10*, this procedure did not materially change the results.

Table 10

Hookworm.—Results of a single treatment of oil of chenopodium (dose 0.2 to 1.50 c. c. given in divided doses, followed in an hour by a purgative of magnesium sulphate).

Number of cases	283
Egg count per c. c. (formed basis)	
Before treatment	4,322,700
After treatment	2,187,600
Per cent reduction	49.4
Per cent cured	0

One striking feature of both these series is the fact that not a single specimen was found free from hookworm eggs on repeating the examinations two weeks after treatment. The dose administered was rather below the average, but it has proved to be the maximum dose which may be employed with comparative safety in the field.

Effects of One Treatment of Tetrachlorethylene.—In the course of our investigations fifteen adults on whom egg counts had been made were given a single treatment of 3 c. c. of tetrachlorethylene. The drug was administered in a small amount of sweetened water and was followed immediately by a purgative of sodium

sulphate. The following table reports the results of these treatments:

Table 11

Hookworm.—Results of one treatment of tetrachlorethylene (dose 3.00 c. c., administered in sweetened water) followed immediately by a purgative of sodium sulphate. (Siquinala, Guatemala.)

Number of cases	15
Egg count per c. c. (formed basis)	
Before treatment	140,000
After treatment	23,800
Per cent reduction	83
Per cent cured	20

Because of the small number of cases treated, few conclusions may be drawn from this series of treatments. Since the results obtained were similar to those which have been reported by other workers, they may be considered as being confirmatory, however.

Tetrachlorethylene has been used occasionally by me in the course of routine treatments for hookworm disease over a period of more than seven years. As yet I have not seen any evidences of intoxication from the drug. In a few cases a slight exhilaration, succeeded by dizziness, followed the administration of the drug; in others a slight headache and nausea (which might be attributed to either the fasting or the purge, or both) were complained of. Lamson and Ward state that "there is no reason for classing the drug with carbon tetrachloride."[5] Our experience with the drug has led us to believe that it would be an ideal second treatment in hookworm campaigns. Hexylresorcinol, administered as a first treatment, will remove from 65 to 70 per cent of the hookworms harbored by the patient, as well as 90 to 95 per cent of the ascarids. It is thought that a second treatment of the tetrachlorethylene, administered a week later, would complete the "cure" by removing practically all of the hookworms left after the hexylresorcinol treatment.

Tetrachlorethylene would seem, in our experience, to possess none of the inconveniences that carbon tetrachloride has. It is not toxic and it would seem that it does not cause the migration of ascarids, as carbon tetrachloride frequently does. In fact, in our experience it has proved to be a distinct ascaricide; our cases have been too few to draw definite conclusions from them, however.

The Effect of Hexylresorcinol on Other Helminth Infections.—While our experiments were carried out for the purpose of determining the effect of hexylresorcinol on hookworm infections, the eggs of the other common intestinal helminths were taken into account in the egg counts made before and after treatments. It is not my purpose to give the details of these egg counts, in tables, as has been done with hookworm egg counts. The results obtained will be given in terms of the percentage reduction in the total egg count for each individual group.

Ascaris.—Our experience with hexylresorcinol confirms the results which were obtained by Lamson and his co-workers in the treatment of ascaris infections.[4] With the exception of the single series in which the purgative was administered two hours after the anthelmintic, the efficiency of the drug against ascaris ranged from 93.4 to 98 per cent (average 96.4 per cent). These results were based on egg counts before and after treatments. In the series referred to (hexylresorcinol in capsules, followed by a purgative of sodium sulphate two hours later), the reduction in the total egg count was 83.3 per cent. The administration of phenolphthalein simultaneously with hexylresorcinol did not materially change these results, the efficiency of the drug against ascaris being 93.9 and 98.3 per cent, respectively, in the two series in which phenolphthalein was used as a purgative. An average of 72 per cent of cures resulted from these treatments.

Two treatments of hexylresorcinol increased the efficiency of the drug against ascaris only slightly, as might be expected; although the percentage of cures was still further increased, it is evident that the administration of a second treatment of hexylresorcinol for the purpose of removing the few remaining ascaris would scarcely be warranted in treatment campaigns.

Comparison with Chenopodium.—Chenopodium has been used as an ascaricide from time immemorial. Since Schüffner and Vervoort tried it against hookworm in Sumatra,[17] it has been widely used in treatment campaigns. Rowan and I first used it on a large scale in the treatment of hookworm disease in Guatemala in 1915.[18] Since the introduction of carbon tetrachloride it has been used extensively for removing ascarids before the administration of carbon tetrachloride in the treatment of hookworm disease. My experience with the drug as an ascaricide has been somewhat disappointing, however. Unless given in large doses it does not remove a high percentage of the worms; the administration of large doses is a dangerous procedure under field conditions. In order to determine the effect of the drug on ascaris infections, the egg counts made for determining its efficacy against hookworms (*Tables 9* and *10*), also included the eggs of ascaris. In repeating the egg counts two weeks after treatment, ascaris eggs

were again included. The effects of chenopodium on the ascaris infections present are given in the following summaries.

In one series of 89 cases, doses of chenopodium varying (according to age) from 0.2 to a maximum of 1.50 c. c., administered in magnesium sulphate solution, caused a reduction of 69.8 per cent in the total egg count, 35.9 per cent of the infected individuals being cured. In a subsequent series of 137, the treatment was given in two divided doses, the last dose being followed by a purge of magnesium sulphate one hour later. In this series the reduction in the egg count was slightly lower, being 65.2 per cent. The percentage of cures was increased to 51.8, however.

From the foregoing it will be noted that chenopodium in doses which may be safely employed in the field is markedly less effective against ascaris than hexylresorcinol. As has already been shown, it is also less effective against hookworms.

Trichuris.—The effects of hexylresorcinol on trichuris have been confusing and, on the whole, somewhat disappointing. In the first series of hookworm cases treated (hexylresorcinol in capsules, followed in two hours by a purge of sodium sulphate), there was a slight increase in the trichuris egg count following the treatments. In the other series (44 cases), treated with capsules (followed by a purgative twenty-four hours later) a reduction of 48.5 per cent in the total egg count occurred. In the several series of treatments administered in pill form in Guatemala, reductions varying from 42 to 52 per cent occurred, the average being 45.5 per cent. In the two series in which hexylresorcinol was administered simultaneously with phenolphthalein, the efficacy of the drug against trichuris seemed to be diminished, the percentage reduction in the egg count dropping to 31.1. Trichuris infections found incidental to hookworms in Panama were too light to make it possible to draw any conclusions from results obtained. Such results as were obtained tend to confirm our experience in Guatemala. In the series in which two treatments were given on consecutive days, a reduction of 83.8 per cent in the total egg count occurred. The total egg count for the group was entirely too small to warrant drawing any conclusions from these figures.

While our results in the treatment of trichuris infections have not been quite so good as those reported by Lamson and his co-workers,[4] they, at least, are better than those which have been reported for any of the anthelmintics usually employed against hookworms. The egg laying habits of whipworms seem to be quite irregular and easily upset, and it is my opinion that results based on differential egg counts before and after treatment are less reliable than is the case with the other common intestinal helminths, hookworms and ascaris.

CONCLUSIONS

A total of 1,784 treatments of hexylresorcinol were administered during the course of our experiments. We observed no toxic symptoms from the drug. Slight gastric irritation occurred occasionally, but nausea was rare and vomiting did not occur.

On account of the action of hexylresorcinol on the gelatin of capsules, the drug is best administered in sugar-coated pills.

Full therapeutic (1.00 gram) doses of the drug removed from 65 to 72 per cent of hookworms under field conditions. The efficacy of the drug is greatly lessened if it is not given on an empty stomach or if food is taken shortly after administration. Clearing the intestinal tract of extraneous matter by a preliminary purge would probably increase the efficiency of the drug and this would be a recommendable procedure in the treatment of individual cases.

In the treatment of ascaris infections the drug is probably without an equal. From 93 to 98 per cent of the ascarids harbored by the individuals treated were expelled by a single treatment.

In the treatment of whipworm infestations the drug appears to be less effective than earlier reports indicated. It would, however, appear to be the most effective drug we have against this parasite at the present time. Only higuerolatix (the latex of the wild tropical fig, *Ficus laurifolia*) removes a larger percentage of the worms.

The administration of a purge two hours after the drug lessens its anthelmintic effect. On account of its delayed action, phenolphthalein may be administered simultaneously with the drug without lessening its efficiency against hookworms and ascaris. If saline purgatives are employed, these should not be administered until several hours later, preferably the following morning.

In the treatment of hookworm disease, a single dose of hexylresorcinol lessens the worm burden to the extent that the patient is relieved of most of the symptoms. It does not, however, entirely eliminate the danger to others, since the majority of individuals treated still harbor a sufficiently large number of worms to be consid-

ered "carriers." In treatment campaigns which are being conducted for the purpose of reducing mass infection, a second treatment (preferably of some anthelmintic which possesses a more selective action against hookworm, tetrachlorethylene, carbon tetrachloride or thymol), would seem to be indicated.

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DISCUSSION (*Abstract*)

Dr. Paul D. Lamson, Nashville, Tenn.—It is extremely gratifying to find that Dr. Molloy has had such success with hexylresorcinol in the treatment of both ascariasis and hookworm disease. From our experiments we had expected that if proper precautions were taken to see that the hexylresorcinol was administered when food was absent in the intestinal tract, almost all ascaris could be removed with a single dose of hexylresorcinol. We were not, however, prepared to expect such good reports from its use in hookworm disease. This was not because we had been unable to remove a high percentage of hookworm with hexylresorcinol, as in some instances practically every hookworm had been removed from small groups with a single dose, but we did find that the average reduction in the egg count was considerably less in hookworm disease than in ascariasis. As such extremely high percentages of removal have been reported with other anthelmintics in hookworm disease, we were inclined to believe that hexylresorcinol could not compare with these others from the point of efficiency. It is extremely interesting to find that an investigator, who has had as wide an experience as Dr. Molloy, feels that the results obtained with hexylresorcinol in the treatment of hookworm disease compare quite favorably with those obtained with other anthelmintics.

Of even more importance is the fact that Dr. Molloy reports no cases of intoxication of any sort having followed his use of hexylresorcinol. Pharmacologically, we have been unable to demonstrate any reason to expect intoxication after reasonable doses of this substance and, although the four or five thousand cases which have thus far been treated with hexylresorcinol cannot be compared with the millions treated with other anthelmintics, it is encouraging to find that no intoxication was observed in these series.

At present, the only contraindication of which we know in the use of hexylresorcinol is its local irritant action in the mouth. This can be entirely avoided by administering hexylresorcinol in the form of pills when these are properly given. If, however, these pills are chewed, a good deal of temporary irritation in the mouth may follow and attempts are now being made to devise a non-irritating preparation. Such a one seems to have been found, but further experiments will be necessary before its entire success can be established.

Dr. W. W. Cort, Baltimore, Md.—I want to express my agreement with Dr. Malloy's statement as to the value of the egg-counting method in measuring the efficacy of anthelminthic treatment. It is the only method that can be used under field conditions with groups of any size to test the reduction in worm burden produced by treatment. The results obtained by this method have been consistent and there is no evidence that the egg output of the infestation of a group as measured by the egg count does not give a reasonably accurate index of the number of worms harbored.

Dr. Ernest Carroll Faust, New Orleans, La.—Crystalline hexylresorcinol administered by mouth in combination with hexylresorcinol 1:1000 (S. T. 37) as a high enema is valuable in the eradication of the seatworm (*Enterobius vermicularis*). In my experience several cases of long standing were cured by this therapeusis during the past year.

Dr. Molloy (closing).—I feel that hexylresorcinol is a valuable addition to anthelmintic medication. The difficulties attending its administration are real and in the hands of inexperienced individuals it might do harm. In the hands of experienced dispensers, such as the members of the hookworm control staffs of the Central American health departments (many of whom have administered as many as 100,000 treatments with the anthelmintics formerly employed), these difficulties are more than offset by the many advantages which it has. As an ascaricide it is undoubtedly without an equal; against hookworms it is certainly as efficient as chenopodium, in the doses which may be safely employed in the field. Its effect on trichuris infections is less striking, but it is probably the most efficient drug we have in the treatment of this infection, with the possible exception of "higuerolatix" (the sap of the wild tropical fig), which is not available commercially. I sin-

cerely hope that Dr. Lamson will continue his work on the development of some more easily administered form of the drug and that we may soon have the drug in a form which can be administered to very young children. It is difficult to administer the drug to infants in the form in which it is now put up.

AN APPRAISAL OF THE VALUE OF VACCINE THERAPY IN CHRONIC ARTHRITIS*

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I. INTRODUCTION

The confusion which has long existed, due to the synonymous use of the words rheumatism and arthritis, has been greatly clarified in recent years. As Barker states it, "Rheumatism has been passed through a prism and has been broken up as white light into its constituents, with the result that rheumatism, as a single entity, has disappeared." Many workers have contributed to the present conception, one which has been elaborated and disseminated, particularly through the efforts of the American Committee for the Control of Rheumatism, working in close harmony with a similar International Committee, toward the solution of a problem which dates back to remote antiquity, and is of such widespread economic importance as to challenge the most earnest thought and efforts of the entire medical profession.

According to the contemporaneous view, "Chronic arthritis is a generic term applied to a large group of chronic affections of various etiologies." This is meant to convey the idea that chronic arthritis is in no sense an entity, but rather a group of diseases in which joint manifestations are prominent. In the past, many classifications based on presumed etiology, pathological changes, and so on, led to the introduction of new descriptive terms, and greatly added to the confusion. Now, at least as a working basis, two main groups or types of chronic arthritis are recognized: the atrophic and hypertrophic (American terminology), which are synonymous with the rheumatoid and osteoarthritis of British terminology. A knowledge of the many other terms which have been used to describe these conditions is important for physicians to be familiar with. Though the fact is not finally established, the belief is held that these two forms are probably entirely different diseases. The subsequent discussion in this paper will apply to these two forms alone, and will have no reference to those types of arthritis of known specific etiology, of accepted metabolic origin, nor to the arthropathies encountered in diseases of the nervous system. The characteristic clinical features, laboratory findings and x-ray changes peculiar to each type have been so frequently described that consideration of them at this time is both unnecessary and impossible.

As a further necessary introduction to the subject, one of the concepts of the American Committee should be reiterated. It reads as follows:

> "It is the opinion of the Committee that at the present time no single infectious agent or any completely defined dietary deficiency or metabolic disturbance has been conclusively shown to be the sole cause of these disorders."

In other words, etiological factors or combinations of them, whether they be regarded as predisposing, influencing or precipitating in their manner of effect, are apparently many. Age, sex, body build, living conditions, temperature variations, dietary deficiencies, faulty intestinal functioning, inborn errors of metabolism, inadequate vasomotor stability, endocrine dysfunction, and a host of other factors have been mentioned as components in the complex etiological foundation of these diseases. Regardless of just what part each may play, it is most important to keep this "multiple etiology" concept clearly in mind, since it has a very definite bearing, both on the interpretation of the value of vaccine treatment as well as on the much-debated question of the role of infection in these two forms of arthritis.

II. ACUTE RHEUMATIC FEVER AND ATROPHIC ARTHRITIS

There are many clinical points of similarity between acute rheumatic fever and atrophic arthritis; few, if any, between the former and the hypertrophic form. It is common knowledge that for years acute rheumatic fever has been the subject of intensive bacteriological studies in the quest for a specific microbe. Many circumstances have contributed to the various discordances, both of opinion and findings. It has not always been easy to know just when a particular case might indisputably be classed as acute rheumatic fever. Only recently, and even now none too well, have the nature and the number and the varieties of streptococci encountered in both health and disease been ap-

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preciated. Earlier studies and their conclusions have either been vitiated or at least rendered questionable by more recent studies dealing with the complex subject of bacterial dissociation, and equally by an increasing amount of evidence pointing toward the importance of the allergic reaction of the host toward either type specific or species specific streptococcus infections. An analysis of all of the accumulated data unquestionably favors the implication of hemolytic streptococci in "the rheumatic state," a term adopted by Coburn "to designate all of the conditions related to rheumatic fever." The weight of evidence, though favoring bacterial infection as the ultimate etiological factor in "the rheumatic state," repudiates the belief that the joint manifestations themselves are the result of actual local bacterial invasion. The work particularly of Swift and his associates, Zinsser and others, has led to the theory that

"Any kind of streptococcus capable of causing a local infection may produce a state of excitation, allergy or hyperergy in the tissues of a susceptible host, and while the tissues of this host are still in a hyperergic state, further infection of its tissues with any streptococcus or its toxin may produce a more or less marked reaction."

Stated another way, hypersensitiveness to various strains of streptococci, chiefly those of the alpha, gamma and beta type, is the cause of an acute clinical attack of rheumatic fever in those who, by reason of other factors not yet clearly evaluated, are ready for such an attack. As Swift says,

"The so-called allergic theory does not establish unequivocably the etiological relation of streptococci in rheumatic fever, but only furnishes us with the best explanation of how different strains can all induce a similar clinical and microscopic picture."

For this and many other reasons he advises the trial of vaccine treatment, given intravenously, and beginning with minute amounts, to lessen and finally control the effect of minute, local and even non-detectable foci of infection.

This conception, so far as acute rheumatic fever is concerned, has been stressed because of its direct bearing upon the vaccine therapy problem in the cases classed as chronic infectious or atrophic arthritis. Acute rheumatic fever has long been believed to have a bacteriological etiology of a varied nature. The conviction that the streptococcus group is the chief offender has gradually gained more and more credence ever since the focal infection theory was advanced by Billings and elaborated through the elective localization researches of Rosenow. A perusal of Thomson's historical review on this subject will reveal the claims and counter-claims of those whose belief in the specificity of one organism or in the apparent ability of many organisms of unrelated species to produce the disease is in conflict with the view that organisms of any type whatsoever are to be regarded as secondary factors in an etiological sense. Up to this time the blood and joint culture findings of Cecil and his associates have not met with sufficient confirmation at the hands of many other competent students of the same problem. Dawson, Olmstead and Boots, working in the Arthritis Clinic of the Presbyterian Hospital in New York, have been unable to substantiate Cecil's claims. Lichtman and Gross recently reported 762 positive blood cultures in 5,233 consecutive blood cultures, with quite as high an incidence of positive findings in a control group of cases which could in no way be related to the rheumatic group of diseases. Nonetheless, the summation of all evidence to date has strengthened the conviction that atrophic arthritis, like acute rheumatic fever, is in some way closely related to streptococcus infection, as yet not conclusively shown to be of any constant specific type. Finally, atrophic arthritis, in so far as its joint manifestations are concerned, is most probably an allergic process, even though viable bacteria are exceptionally recovered from joint cultures. Such an attitude seems more tenable than the older one, which presupposed the dissemination of living organisms from a given focus, and subsequent arthritic changes resulting from active local bacterial colonization.

III. RESULT OF QUESTIONNAIRE

In the light of the foregoing, it is little wonder that there exists such a diversity of opinion as to the value of vaccines in the treatment of the forms of arthritis under discussion. In an attempt to secure a cross-section of opinion on this matter, a questionnaire was sent to a number of prominent internists in the leading medical centers of the country, many of them pioneers in this field of investigation, as well as to a group of pre-eminent immunologists and bacteriologists. (The answer of one man known well for his studies on this particular subject just about sums the whole matter up. He states in a personal communication: "This is a hopeless problem to evaluate, when the leading proponents of vaccine therapy have little or no agreement among themselves.") An analysis of the replies is revealing, and may be summarized briefly, as follows:

(1) Approximately two-thirds concur in the opinion that vaccines are of value when used

at the proper time and in the proper manner, whatever they may be. The balance see little if any benefits directly traceable to vaccine therapy.

(2) Autogenous vaccines are preferable to the majority. Stock vaccines are equally good to a minority. Not a few insist that the action of vaccines is entirely non-specific and, hence, any foreign protein, typhoid vaccine in particular, may be employed instead with equally good results.

(3) Vaccines made from cultures recovered from active foci of infection represent the best source of supply, according to most. Some express a preference for the use of streptococci recovered from the intestinal tract and, as might be inferred, others maintain that the source of the vaccine is probably immaterial. There is no apparent uniformity employed in the culture of the organisms nor in the preparation of the vaccine itself; apparently the bacterial suspensions are most often sterilized by the use of heat.

(4) Over 75 per cent agree as to the non-existence of any well established constant clinical criteria by means of which the benefit or failure of vaccine treatment can be predicted. Many are convinced that the earlier the case, the better the probable effect; that vaccines become less and less helpful in proportion to the duration of the disease; that it is probably unwise to administer them when the patient is acutely ill or on the down-grade; with but one exception in the replies received, all apparently concur in the uselessness of vaccines in hypertrophic arthritis, except in those vaguely defined instances which suggest a transitional stage from a previous atrophic picture.

(5) Criteria employed to serve as an indication for the use of vaccines, for the size of the initial and subsequent doses, or for the cessation of the treatment entirely, vary from none at all to testing the agglutinin titre of the patient's serum against autogenous organisms or type strains recovered from other patients, the utilization of the sedimentation test of the blood, skin reactions to intradermal injections, and complement fixation studies, long advocated, particularly by Burbank. Here, too, disturbing conflicts are encountered; for instance, Cecil believes that clinical improvement parallels reduction in the agglutinin titre of the patient's blood; whereas, Clawson and Wetherby report success in 80 per cent of their cases coincident with a pronounced rise in the blood agglutinins; yet both apparently agree, as do the majority of others, that whatever benefits accrue from vaccines, they are probably dependent upon a desensitization process rather than upon specific antibody production.

(6) The initial dosage varies from an extreme of fifty organisms to one hundred or more million. Small doses, insufficient to cause constitutional reactions, are most advocated. Opinion is about equally divided between the advantages of intravenous injections, which are thought not to increase hypersensitiveness, and the subcutaneous route, which does.

Such, in brief, is a picture of the conflict of opinion as revealed by the internist's point of view. Unfortunately, when such a state as this exists among the presumed leaders in the profession, it is obvious that as yet there is no satisfactory guide for the mass of general practitioners, among whom the use of heterogeneous vaccines is admittedly extensive.

The appraisal of the value of vaccines in arthritis is still further confused when one analyzes the replies received from intense students of the whole subject of immunology and bacteriology, and the more recent articles that have appeared in immunological journals and in monographs bearing on this very complex subject. Suffice it to say, information derived from these various sources very well leads to the question: do we really know just what we are trying to accomplish by the use of vaccines, except as they are used in prophylactic, active immunization? In certain diseases, such as smallpox, typhoid fever, diphtheria, anthrax and rabies, clinical results have been so satisfactory that there is unanimity of opinion as to the advisability of their use; "vaccines have proven of more value in the prevention than in the treatment of disease" thus far. One immunologist of international repute, in a personal communication, states that most of the old work, both clinical and in the laboratory, will need to be done over, in the light of what we now know about bacterial dissociation and antigenic changes. He further calls attention to the fact that, so far as he is aware, very little work has been done by clinicians, in which "smoothness" and "roughness," or the biological properties of the cultures furnishing the vaccines, have been considered. By "smoothness" and "roughness" he refers to those relatively recent researches by which it has been demonstrated that antibodies, significant to increased resistance, "are incited only by the so-called smooth (in gross appearance) virulent mutants, in which the nucleoprotein and carbohydrate fractions are present in an undissociated

form." Further studies have shown that dissociation, which may occur under a variety of circumstances, will result, though not universally, in the production of "rough" colonies. Vaccines made from such colonies do not contain the carbohydrate fraction, and are capable only of producing antibodies to the nucleoprotein fraction. These so-called "rough" colonies seem to constitute an avirulent mutant of that particular organism and to possess immunizing capacities as yet poorly defined. A great many other theoretical and practical results of recent immunological studies at least lead to the conclusion that a vaccine, to be of probable value, should contain the whole bacterial antigen. Granted that such is the case, all call attention to the fact that the nucleoprotein and carbohydrate fractions, which constitute the whole bacterial antigen, are bound together in a very loose way and are easily broken up by solution, by autolysis, and, in some instances, by heat sterilization, unless the heat be of such a low temperature that it would probably be inadequate from the standpoint of sterilization. With these and other considerations in mind, several voice the belief that we do not yet know what the best method of preparing vaccines actually is; nor is it clear just what they are supposed to do! Whatever that may ultimately turn out to be, it is probably essential, first, that the organism in question be shown or known to be an antigenically potent strain, and, second, that antigenic dissociation must be avoided in the process of vaccine preparation. Kolmer, in a recent article, entitled "The Principles of Vaccine Therapy," tersely calls attention to these facts and a number of others, many of which are probably not known or considered seriously enough in the routine laboratory preparation of autogenous vaccines, which are certainly preferable, according to most opinions. On this point, Tillett comments as follows:

"From a purely scientific point of view, the rationale of autogenous vaccines is based upon a series of assumptions, each pyramided on the other. One must assume (1) that the organism comes actually from a diseased part of the patient; (2) that it is the etiological agent of the disease; (3) that its growth on artificial media has not caused its degradation from its original disease-producing capacity; and (4) that the injection of the known causative agent of a disease is effective treatment. In other words, to insist on the value of autogenous vaccines requires the acceptance of pyramided assumptions, which is difficult."

When it comes to a discussion of the various methods employed to determine the so-called immunizing effect of vaccine therapy, one finds again a disinclination to accept some of the assumptions upon which recent clinical researches have been based. One author, for instance, states:

"There are few, if any, modern immunologists who believe that agglutinins and precipitins play any significant role in immunity."

Perhaps a better statement would be that demonstrable agglutinins do not play the only role in immunity. In one of the most recent journals the statement occurs that in the present state of immunological knowledge, the significance of the agglutination reaction in atrophic arthritis serum is largely a matter of conjecture. In their most recent publication on this subject, Clawson and Wetherby conclude "that both chronic atrophic arthritis and acute rheumatic fever are due to a streptococcic infection, but that neither of these diseases is produced by a specific strain of streptococcus." A number incline to the view that perhaps a better method of approach to the appraisal of the therapeutic usefulness of vaccines would be by the resumption of the now almost completely neglected opsonic index of Wright. There is much evidence tending to show that there is no demonstrable increase in bacteriolysins as a result of vaccine treatment. Topley and Wilson, in their recent book, state in their discussion of the "vexed" question of vaccine therapy that it is extraordinarily difficult to arrive at any conclusion as to the validity of the claims which have been put forward with regard to the efficacy of this particular method of treatment as applied to the whole range of bacterial infection; and in the conclusion of their section on active immunization in treatment, they go on record as believing that

"The progress of immunology as a branch of science has been gravely hindered by the premature and unscientific exploitation of vaccine therapy without regard to the data which observation and experiment have made available."

Vaughan, an intense student of the entire subject of allergy, points out the fact that our clinical knowledge of bacterial allergy and vaccine treatment is still very obscure on many points, and leans to the view that we must not hope for any outstanding advances until some of the problems to which he refers in his paper have received much more elucidation.

One might go on at length, giving arguments and quotations from others, all of which seem to have the same general trend and leave one with the conviction that in the light of much evidence, a large part of which is probably not well known to the average clinician, particularly since it is still in an involved state in the minds

of immunologists, the whole status of vaccines and their therapeutic use in arthritis is in a most unsettled and empirical state.

IV. CONCLUSION

What, then, is the conclusion of the whole matter?

First, the not infrequent, brilliant therapeutic results which seem clinically to follow vaccine administration, justify the belief that vaccines do have a role in the comprehensive treatment of the arthritic patient. Just what the specific indications are for the use of vaccines, their dosage, their method of administration, etc., must still be left as open questions. At the moment it would appear that vaccine therapy in chronic arthritis is appropriately limited to the atrophic form, and has little, if any, application in the hypertrophic type.

Second, the consensus of opinion inclines to the view that the mechanism whereby improvement occurs under vaccine administration is in some way related to a desensitization process rather than to the formation of specific antibodies. In harmony with such a concept, small doses of vaccine are most advocated, given preferably intravenously, and continued over a long period of time, avoiding pronounced constitutional reactions.

Third, regardless of whether this conception is substantiated or not, it would seem apparent that in the light of more recent bacteriological studies, greater attention should be paid to the process of vaccine preparation, chiefly in terms of attempting to secure virulent strains of the autogenous disease-provoking organisms, and the avoidance of such measures as promote antigenic dissociation in preparing the vaccine for therapeutic use.

Fourth, at present there are no so-called immunological or laboratory procedures which are established standards or indices of the therapeutic value of vaccines in the comprehensive program necessary for any arthritic patient.

Finally, it is to be hoped that more rigorous regard for some of these principles which have been briefly alluded to, will, for the time being, both retard the extravagant claims which are made by some as to the value of vaccines in chronic arthritis, and at the same time provoke a more serious consideration of just what one is attempting to do when vaccines are used.

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DISCUSSION (*Abstract*)

Dr. W. R. Houston, Augusta, Ga.—This temperate and careful appraisal of vaccine therapy in arthritis does not leave room for the most captious critic to charge the author with cocksure dogmatism. In fact, I should be willing to go somewhat further than Dr. Miller and say that of the therapeutic plans for treatment of infectious arthritis which might be considered definitely aggressive, the use of vaccine is the most hopeful. As to what vaccine should be used, an autogenous streptococcus, a streptococcus that is agglutinated by the patient's serum, or a stock mixture of various streptococcal strains, I feel much doubt. Again as to whether the dose should be small, producing little or no reaction, or large enough to produce a violent reaction, there is much question. A number of years ago when a proprietary mixture of many streptococcus strains was exploited under the name of phylacogen, I saw a number of good results from using this preparation, in doses sufficient to produce chill and fever. J.

L. Miller at Detroit, in 1930, in discussing non-specific protein therapy, gave a very interesting account of the history of phylacogen and the strikingly good results obtained by its originator in a large series of cases. Cecil is now using small doses of streptococci of a strain that is agglutinated by the patient's serum. It is by no means proven that the attempt at specificity in these vaccines will be rewarded. In a pontifical pronouncement, put forward, it may be remarked incidentally, with the purpose of moderating the ardor of the allergists, J. L. Miller and W. R. Manwaring, of the Research Council, say: "Statistics show that no immunological theory of the past three decades has been more than 5 per cent clinically efficient." The impartial mathematician on the basis of experience would unhesitatingly predict that of twenty theoretically logical, laboratory-endorsed vaccines, only one would prove a clinical success.

It is very difficult to judge the value of a therapeutic measure in arthritis for lack of knowledge of what would have happened if it had not been used. Despite the efforts of the committee for standardizing the study of rheumatism, the primer that it has gotten out for simple minds, and the efforts made to unify the conception of the types to be treated, it was strongly evident at the last convention in New Orleans that those who read papers must have failed to read the primer or, at all events, to believe in it. A prerequisite to an assay of therapeutic method is some statistical evidence as to the natural history of the disease. Suppose that it could be established that of 100 cases of chronic infectious arthritis, 10 in spite of everything would go on to complete crippling and permanent disability, 50 would get well by wearing a rheumatism ring or carrying a buckeye in the pocket, the remaining 40 would represent the number whose welfare might be influenced by therapeutic measures. Our statistical studies suffer greatly from our not taking into account the 50 who would have gotten well anyhow and the 10 whom nothing avails to help. The warm faith of the American medical profession in the focal infection theory stands in striking contrast with the attitude of our European colleagues, who not only take little stock in it, but often treat it with ridicule. Removal of focal infections, which has enjoyed a vogue somewhat like that of phlebotomy one hundred years ago, is mentioned here to illustrate how dangerous it may be to make fashionable a plan of treatment which lacks the essentials of any true demonstration of effectiveness, and to emphasize the value of maintaining unshaken the conservative attitude adopted by Dr. Miller.

Dr. Morris Flexner, Louisville, Ky.—The subject of arthritis has labored under a spell of confusion for centuries and while great light has been shed on some phases of the disease in the past twenty-five years, the final chapter is some distance in the offing. The American Committee for the Control of Rheumatism deserves great praise for its efforts for the advancement of scientific information and for its endeavor to spread the fundamental facts and theories of the disease to practitioners of medicine. It is hoped they will continue to function as an organization until many of the confronting problems are nearer solution.

It seems to be universally agreed that if any organism is to be convicted as the inciting agent in arthritis it is the streptococcus. What is confusing is the fact that there are differences in the types of streptococci found: some are hemolytic, some non-hemolytic, some viridans and others of the intestinal group. Cecil refers to "atypical attenuated hemolytic streptococci" as the dominant strain. Wetherby and Clawson say of organisms which they have recovered that "they do not represent a special strain type." Burbank says that his "mostly belong to the infrequent and fecalis group." Certainly there is lacking here the conciseness that Dochez, Tunnicliff, the Dicks, Lancefield and Birkhaug gave to the work on the streptococci of scarlet fever and erysipelas, although Cecil in his effort to bring some order out of the chaos, did an extensive, careful piece of work. When streptococci cannot be obtained from the blood stream or arthritic joints, they may be sought from about the teeth, gums, throat, upper nares, and stool, as advocated by Burbank. Attempts are made to incriminate the various strains by doing complement-fixation tests with the patient's serum, using the streptococci as antigens. Those that are positive are included in the vaccine as are any of a series of stock strains from other arthritic foci. There has been much criticism of this particular method. Burbank's doses of vaccine are small and he reduces them if a reaction occurs. They are about 1/20 the original dose of Wetherby and Clawson, yet both note about the same percentage of improvements, between 70 and 75 per cent in large series, taking patients of all ages and making no attempt to classify them sharply according to their lesions. Improvement occurred in the elderly in both series, causing them to adhere to the belief in the infectious origin of the disease even here.

The idea that arthritis is a local allergic expression of an existing streptococcic infection has gained strength in recent years. The conception that improvement would result from desensitization followed soon. This is the aim of Crowe, Burbank, Wetherby and Clawson, Small and others as contrasted to the old idea of increasing the immunity by the subcutaneous injection of large doses of vaccine. In the intravenous method two results are obtained, the patient is desensitized and a high agglutinating titer in the serum is produced.

Burbank noticed that the complement-fixation test became negative after successful treatment. Such facts seem to point to a specific therapy rather than non-specific as occurs in the case of intravenous typhoid injection with its shock and febrile response.

Shuster, from the New York Hospital, employs the technic of M. Solis-Cohen culturing focal strains of streptococci in the patient's own blood, regarding the survivors as pathogenic and doing complement-fixation tests on them, selecting the positive organisms. He considers that his antigen is more specific, and proves that it is by comparative figures in a fairly large series of cases.

From the facts at hand a ray of hope seems to shine. The percentage of improvement by this method encourages us. Vaccines should be combined with a regime which we know from experience to be beneficial: diet, physiotherapy, proper elimination and exercise. To date the best reports have been made from the large clinical centers with trained laboratory workers. Reliable streptococcic immunological studies will hardly be obtained from the average small commercial laboratory. Autogenous vaccines can be prepared, but with what results? Will they be preferable to stock vaccines?

May I suggest that this problem be placed at the feet of that august body, "The American Committee

for the Control of Rheumatism" with a request for guidance and solution.

Dr. E. Goldfain, Oklahoma City, Okla.—In my opinion, the reasons back of the antagonistic reactions of most physicians in respect to the benefit of vaccine therapy in chronic arthritis are two-fold. To begin with, they continue to adhere to the principle that the greater the dosage the better the result. In the vaccine treatment of chronic arthritis, this principle is wrong. The newer attitude should be, "the smallest dose possible consistent with improvement of a progressive nature."

In my work with vaccine therapy in chronic arthritis, the following criteria have been developed:

(1) Excessive dosage has been given when as a result of vaccine injection no reaction occurs and the patient consistently becomes worse.

(2) A general systemic reaction occurs when with a reduction to 1/100 of the former dose the patient loses weight, runs temperature, has lowered blood pressure, increased pulse rate and aggravation of the psychic and physical symptoms of the disease.

(3) A marked or moderate focal reaction is obtained when the last mentioned dose is decreased to 1/10 to 1/50, following which the patient experiences a marked increase of swelling, pain, stiffness and limitation of motion of his affected parts within the next 24, 72 or 96 hours.

(4) Improvement dose is obtained if the focal reaction dose is further reduced to 1/2 or 1/5. This will cause a feeling of well being, diminution of pain and swelling, and of stiffness, greater freedom of motion, gain in weight and general systemic improvement.

The aim of vaccine therapy in chronic arthritis should be to produce an improvement reaction only.

A second reason for the failure to give full credit to the real effectiveness of vaccine therapy in chronic arthritis is due to the fact that the physician fails to take into account the following factors that act to vitiate the favorable effects of vaccine injections:

(1) An active non-draining focus of infection. The case that is not doing well on vaccine treatment should be rechecked for foci of infection.

(2) Intercurrent diseases. Such diseased states as menstrual disturbances, severe or mild acute upper respiratory infections, tuberculosis, diabetes or syphilis may be present or supervene while the patient is under treatment and set at naught the effects of vaccine. The patient must be properly treated on a sound medical basis.

(3) Auto-inoculation. When the favorable effects of vaccine treatment enable the patient to enjoy greater freedom of motion and activity, he is likely to overexercise his newly regained powers. By increased activity, he causes too large an absorption of toxic and infectious material from the diseased joints and a consequent retardation of his improvement.

(4) Extreme hypersensitiveness. Some cases, rather rare, are highly sensitive to the bacterial products that the doses employed in their treatment must be so minute that one questions whether good is being done. In these cases, non-specific desensitization should be tried.

In conclusion, I feel that if one will familiarize himself with the newer concepts of vaccine therapy in the treatment of chronic arthritis; and look for other causes in cases that do not respond well to vaccine therapy, he will find that the per cent of cures and improvements of his cases will be far greater than without the use of vaccine.

Dr. John W. Scott, Lexington, Ky.—There are two distinct therapeutic aims in the use of an antigen. These aims are immunization and desensitization and the method of attaining them is by no means the same.

This was emphasized in a discussion of this subject by Dr. Burbank published in the *Journal of the American Medical Association* last summer. As I remember, he referred to small desensitizing doses of vaccine as opposed to larger immunizing doses. Dr. S. E. Dorst, of Cincinnati, said that there is a great difference between the treatment of an individual who has antigen present in his body and one who has not. In other words, the problem, for instance, of immunizing an individual against typhoid fever is not at all like that of desensitizing one to a bacterial or other antigen.

Many of the houses selling antigens fail to grasp this distinction and advise the use of their products in relatively large doses with more or less stereotyped increase in dosage. Some distinguished immunologists seem to advise similar methods. The result is that there is very general use of vaccines, both stock and antogenous, in doses which seem to me to be so large that sensitization rather than desensitization is apt to result.

ETIOLOGY AND PATHOGENESIS OF RENAL INFECTIONS*

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A thorough exposition of the etiology and pathogenesis of non-tuberculous kidney infections would entail a recital of the numerous experimental and clinical observations that make up our modern knowledge of the subject, together with an extended description of the varied pathologic anatomy that the lesions present. Such a study would be too long for a place in this symposium, nor is it desirable, for the essential pathologic anatomy is well and generally known and a great many of the researches have had to deal with matters that now have a historical rather than a practical bearing on the subject. Accordingly I will devote the time allotted to a short consideration of the bacteria ordinarily concerned and the lesions that they produce, to a review of what may happen to a single infected renal focus, and to a discussion of the routes by which bacteria may reach the kidney. To consider renal infection as a single entity with various causes, localizations and complications seems to permit a better concept of the conditions observed than

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to attempt to ascribe a separate etiology and pathology to the numerous anatomical and bacterial types encountered. It must be recognized, however, that one type may merge into another at any time during the course of the disease and that this often happens.

The essential pathologic characteristic of the disease is the presence of bacteria and the products of the inflammation that they induce, including pus, in the kidney. Having gained lodgement in the kidney, the organisms proliferate and either by their growth or the toxins that they generate, produce inflammation with destruction of the parenchymatous cellular elements and proliferation of the interstitial tissues. In brief, the pathologic sequences of purulent inflammation which may range from isolated areas of hemorrhage and round celled infiltration to abscess formation and complete destruction of the organ.

The bacteriology of the disease is extremely complex, the organisms found differing according to the method used in the determination and depending on the age and sex of the host, on the duration of the disease and on whether or not it is complicated by urinary obstruction.[10] While there is evidence, both clinical[4 21] and experimental[11] that the disease may sometimes be a double infection, a coccal infection preparing the soil and bacilli becoming engrafted upon it later,[4] it is probably best for practical purposes to accept the micro-organism present in the urine from the infected kidney as the causative one at the time it is found, since it is upon this point and the presence of pus that the clinical diagnosis and the results of treatment must ordinarily be determined. Bacilli of the colon group are found in from 55 to 90 per cent of cases, cocci in from 2 to 25 per cent and mixed infections and rarely noted bacteria in 2 to 15 per cent.[22]

The lesions produced in pure coccal infections are almost always in the cortex;[5 19 21] those in the bacillary infections are more apt to be in the medulla.[5] Unfortunately for accurate study of the microscopic lesions of each type, by the time an infected human kidney is available for study, the lesions are generally extensive and possibly mixed. Perhaps, too, there have been several attacks of infection, partially or completely healed, with the lesions of each successive attack superimposed on those that have passed. The result is often a conglomeration of lesions the origin of which, both as to time of onset and causal bacteria, is not demonstrable.

The lesions may be single or multiple, probably depending largely on the number of bacteria that the involved kidney receives at a dose. They may predominate in the cortex or in the medulla as noted above and may involve either one or both kidneys, depending on circumstances that are either not known or at least are not clearly demonstrable. Extension of the infection in the kidney itself probably occurs through the lymphatics along the blood vessels so that in instances of extensive involvement the disease is essentially a renal lymphangitis.

Favorable evolution of the primary lesions may result in complete healing, with cessation of infection and inflammation, leaving scarring of little or no consequence; or in cicatrices of such size and position that various secondary lesions such as dilatation of the papillary veins, cysts or partial or complete hydronephrosis of mild or severe grade result. A second possible end-result is healing with the deposition of crystalline constituents of the urine in the infected area so that large or small, single or multiple stones, which may be complicated or not by infection, result. A third possible sequence is rupture of the infected area, either into the blood stream with resultant septicemia, or into the perirenal tissues with localized or diffuse, fibrous or purulent perinephritis following, or into the urinary tubules or kidney pelvis, producing some form or other of pyelonephritis or pyonephrosis. These last two end-results are the most frequent ones and the ones which, in their various forms and complications, are generally thought of when renal infection is mentioned.

Evolution of the lesions of pyelonephritis is materially affected by any hindrance to the outflow of urine from the kidney. In most instances in which infection develops in a kidney previously normal or only slightly affected in this respect, the lesions tend to be relatively mild and to clear up promptly without serious or extensive permanent after effects. If, however, either before the onset or during the course of the disease, free drainage is materially interfered with, the intensity of the general reaction is apt to be accentuated, the extent of the local lesions to be markedly increased and the reparative processes delayed or prevented. Then, unless free drainage can be promptly established and maintained, the effects of pressure atrophy are added to those of the inflammation.

The pathology of pyelonephritis must also include the effect that infection has on the kidney pelvis and ureter. These structures are involved to some extent in every instance of renal infection and, if the attack is prolonged or severe,

or, if several attacks of milder grade are experienced, their walls are seriously affected and the delicate muscular and elastic tissues are replaced by coarse fibrous elements which are neither contractile nor resilient. Grossly, the walls of the pelvis become rigid and indurated and the ureter is increased in length so that it is distorted and may be looped or perhaps kinked. These anatomical changes cripple the expulsive mechanism so that evacuation of the urine into the bladder is delayed and, in extreme grades, there may be a column of stagnant urine a centimeter or more in diameter extending from the bladder to the uppermost renal calyx. This prolongs and increases the intensity and extent of the renal infection and favors recurrence in those rare instances in which a patient with such lesions is fortunate enough to have been relieved of his infection at all.

ETIOLOGY

Apart from introduction through open wounds, the anatomical relations of the kidneys make it possible that bacteria may reach them by way of the blood or lymph streams, through the ureter or by continuity from an inflamed neighboring organ.

The view most widely held at present is that a very large proportion of renal infections, if not all, are hematogenous in origin. This is based on experimental and clinical observations as well as the theoretic possibility noted above.

There is considerable evidence, cited in detail by Cabot and Crabtree[5] and others, that the various bacilli and cocci commonly found in renal infections may pass from the blood into the urine through a kidney which is to all intents and purposes normal. While this is contested on very reasonable grounds by Dyke[8] and others who have demonstrated minute lesions in the kidneys of the experimental animals with which they have worked, the preponderance of evidence today is that the kidney normally acts as a filter to remove living pathogenic bacteria from the blood stream[12] and that, if renal lesions are necessarily produced in the process, they are often very small or of so short a duration as to leave the kidney without either serious or permanent harm.

Experimentally, renal infections have been produced in rabbits by intravenous injections of bacteria following temporary occlusion of the ureter by Lepper,[15] after traumatizing the kidney by Brewer,[1] and without these accessory operations by Helmholz and Beeler,[11 12] and by Bumpus and Meisser.[2 3] Because of differences in species immunity between rabbits and man and because of the artificial conditions of experiment, these findings cannot be taken as conclusive evidence regarding the hematogenous route in human infections in either a positive or a negative way. However, clinical research lends weight to the positive rather than to the negative side. Thus, Cabot and Crabtree[5] produced good evidence that urethral chill, with colon bacilli at least, is a consequence of "bacteriemia, bacteriuria, pyelitis and pyelonephritis," and Nesbit[21] was able to demonstrate the same sequence for coccal infections, while Scott[24] has added confirmation to the frequency of blood stream infections in urologic patients with fever. With this data at hand, it is easy to believe that, having reached the kidney through the blood stream, a bacterium may be excreted without recognizable damage to the organ, or, under different circumstances, produce a lesion that will result in bacteriuria or in one or other of the lesions noted in outlining the pathology of the disease.

Assuming that the kidney is often exposed to bacteria circulating in the blood and thus to the possibility of hematogenous infection, it is necessary to consider why some kidneys are involved and others remain healthy.

Racial and climatic incidence are not sufficiently marked, apart from other influences, to furnish leads as to basic etiology. Personal immunity is evanescent and little understood: fatigue and chilling are recognized as predisposing causes, especially in causing a flare-up of latent cases or in establishing incipient ones. The preponderance of the disease in females and on the right side is doubtless due to increased incidence of circumstances that lead to urinary obstruction.

The most important factor bearing on the susceptibility of the individual kidney has to do with whether or not there is any obstruction to the outflow of urine from it. The predisposing and sustaining effect that urostasis has on renal infection is so universally recognized and accepted as not to require particularization. The obstructive lesions that may be responsible will readily present themselves to mind and will include malformations, injuries, nerve lesions, neoplasms and the results of previous infections, especially if a stone or strategically placed scar is left behind, or, if the pelvis or ureter has been damaged badly enough to produce stasis. The predisposing influence of obstructive lesions probably acts through an associated motor insufficiency which may either precede or result

from the infection. Clinical researches of this feature by means of serial pyelo-ureterograms[14 20] and by pyeloscopy[13] seem on the way to extend our knowledge of the influence of this factor. In just how far traumatism to the kidney, the irritation of stone or venous congestion may predispose to infection without also causing obstruction in one way or another is debatable.

The factor of obstruction will account for a large proportion of renal infections. There remain, however, a considerable number in which no obstruction can be demonstrated or, with strict fairness, assumed. In this group may be placed, for example, many cortical and acute bilateral lesions, some with a history of antecedent respiratory, gastro-intestinal or skin infections, but, more often, without anything to furnish a clue as to the primary focus from which the kidney localization may have sprung. For these it is necessary to assume either some undemonstrable anatomical or pathologic change or to consider factors which have to deal with the nature, virulence and number of the infecting bacteria.

That the nature of the bacteria concerned has a definite influence on the nature of the renal lesion produced is shown by the fact that coccal infections tend to localize in the cortex and bacilli in the medulla,[4 5 19 21] that coccal infection often results in perinephric lesions, while bacillary ones generally eventuate in the milder form of pyelonephritis described as pyelitis. This localization is not constant, however, bacilli sometimes causing cortical lesions and perinephritis and cocci occasionally pyelitis.

The theory of Rosenow[23] that certain strains of pathogenic streptococci have a selective affinity which he terms "tropism" for certain tissues and that, if present in the circulating blood, they tend to localize in certain organs, depending on their tissue tropism, has been largely accepted and applied in practice. A survey of the experiments directed at producing purulent kidney lesions by intravenous injection, without artificially lowering the resistance of the organ, shows that the result has depended largely on the source of bacteria used for injection.

Thus Brewer,[1] in the course of his experiments with 16 animals (14 rabbits and 2 dogs) on the influence of traumatism on hematogenous renal infections, using typhoid and colon bacilli and streptococci from sources not stated, noted infective lesions of the uninjured kidney in only 3 (18 per cent) of the 11 animals (68 per cent) that developed lesions on the injured side and in only one of them (5 per cent) were these lesions extensive. Helmholz and Beeler,[11] using colon bacilli from various lesions in rabbits, secured positive results in only 8 of 66 rabbits injected intravenously (12 per cent) while their results were positive in 22 of 32 rabbits (68 per cent) injected with a strain of colon bacilli obtained from a rabbit that had developed an accidental pyelonephritis.[12] Using hemolytic streptococci from the teeth, tonsils, urine and blood of patients with pyelonephritis, Bumpus and Meisser[3] secured positive results in 63 of 82 animals injected (76 per cent).

From these researches it seems evident that the tropism of the bacteria used plays a dominant part in the experimental production of lesions in kidneys which have not had their resistance artificially lowered by injury or urinary stasis. Although work of this sort naturally has not been carried out on human beings, the not uncommon clinical experience of observing renal infections flared up, improved or perhaps cured after the removal of remote foci indicates that some bacterial strains may possess a definite tropism for the human kidney.

Investigations directed at determining cultural or serological characteristics that would indicate whether bacteria were pathogenic for the kidney or not, have not been successful. For streptococci, the property of producing hemolysis is probably an important one.[3] I have not been able to discover researches on this point concerning staphylococci and those with colon bacilli are not convincing.[7 17] It is probable that with the kidney, as with other organs, the question of pathogenicity, so far as it relates to the bacteria concerned alone, depends on some unrecognized toxin.

The role played by the virulence of the organism concerned is difficult to evaluate because of the numerous predisposing and complicating factors that influence the type and course of the lesions found. In general, streptococcus infections are more severe than staphylococcus ones and those of the bacillary type milder than either of these. This statement admits, however, of many qualifications.

That the number of bacteria a kidney receives at one time may have an effect both upon whether or not an infection will develop in it and on the type of lesion that will result, seems logical. It may be reasoned by analogy from the work of MacKenzie and Hawthorne[18] with inert material and has been worked out experimentally for colon bacilli in rabbits by Lepper.[15] The clinical work of Moore,[19] who found closely grouped cortical lesions in staphylococcus infections, indicates the importance of this feature as regards cocci.

That bacteria may ascend to the kidney along the ureter by way of the lymphatics from foci in the lower tract has been worked out experimentally by Carson[6] and others.[19] While, be-

cause of technical difficulties, it has not been demonstrated with certainty by clinical researches, there is no theoretical or practical objection to the idea that inflammation may occur in the kidney by this route in cases of lower tract disease. That it often results by the lymphatic route from the adjacent large bowel or appendix, seems to have been pretty well abandoned in favor of the hematogenous route.

The development of ascending infection through the urine in the ureter in cases with ureteral reflux[16] and in instances in which the uretero-vesical valves stand open undoubtedly occurs. Motile bacteria might readily reach the kidney under such circumstances, gain access to the renal system of lymphatics and thus produce pyelonephritis. That they could take a similar course through an intact and competent ureterovesical valve and against the peristalsis of a normal ureter is open to question. They may, however, reach the kidney from the lower tract by direct extension along an inflamed mucosa.

Direct involvement of the kidney from an infected neighboring organ is probably very rare. In suppurative perinephritis, which would be the most likely of all such lesions to produce renal involvement, the kidney is not always found to be involved and, in those instances in which it is, the renal lesion is considerably more apt to have been primary than secondary. Neither does the hazard of introducing infection by the use of the ureteral instruments seem very great. Febrile reactions following ureteral manipulations are probably more often exacerbations of a latent process due to trauma than from the introduction of infective material. Fortunately they are seldom progressive or permanent.

To summarize the etiology: non-tuberculous renal infections are most often hematogenous in origin. Their occurrence and continuance are favored by the presence of urostasis. In addition, a little understood affinity of the infecting bacteria for the kidney is a definite but imponderable factor in the genesis of the disease.

The kind of infecting bacteria, whether bacilli or cocci, has a definite effect on the kind of lesions produced and on their evolution, but complicating factors such as urostasis and multiple, mixed or successive infections obscure the histologic picture.

That the number and virulence of the infecting bacteria affect the course and character of the lesions has been shown experimentally and may be inferred from clinical researches. These features, however, cannot be demonstrated so as to be of practical clinical worth.

The predominance of the hematogenous route does not exclude the possibility that bacteria may reach the kidney by other routes: more than one route may be, and probably often is, associated both in establishing and continuing the disease.

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Discussion follows paper of Dr. Fowler, page 601.

SYMPTOMATOLOGY AND DIAGNOSIS OF RENAL INFECTIONS*

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For purposes of clarity it is just as well to assume that infections of the renal parenchyma and renal pelvis go hand in hand. I believe it is now generally thought that in the condition to which we refer as "pyelitis" there is a potential or actual "pyelonephritis." Certainly it is hard to believe that an inflammation of the pelvis of the kidney exists without some involvement of the kidney substance taking place sooner or later.

As in any other organ, the pathology may be far out of proportion to the symptoms or the reverse may be true. Unhappily grave pathol-

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ogy may exist without commensurate symptoms, and when the condition is recognized the kidney may be so hopelessly crippled as to be beyond help.

The acute infections usually begin with the classical symptoms of chills, fevers and sweats accompanied by pain which begins in the kidney region and extends along the course of the urinary tract. Urinary disturbances as frequency, dysuria and hematuria occur. There is tenderness over the kidney, which is carried suprapubically because of the ensuing cystitis. Tenderness on percussion in the costo-vertebral angle (Murphy's sign) is often an early indication of kidney infection. It is sometimes possible to obtain a history of a recent focal infection, and as the focal infection flares up so does the renal infection. The urine is loaded with pus cells, giving an opalescent cloudiness to the gross specimen. Cultures are usually positive and the organism easily identified.

Since the symptoms depend on the type of bacteria and the extent of the invasion, there is necessarily great variation. In those cases where the infection is very severe the usual local symptoms do not have time to develop, so the constitutional symptoms of renal failure or sepsis overwhelm the patient and coma ensues from the uremia of renal deficiency, or a septicemia develops. On the other hand, if the infection be mild, there may be few, if any, general symptoms, so the local or urinary tract symptoms will be more pronounced. The location of the pathological tissue in the kidney also affects the symptoms. If the pathology is intense in the pelvis the urinary disturbances are apt to be intense. If the lesion be limited to the cortex of the kidney, urinary disturbances may be entirely lacking. Perirenal inflammation or abscess may occur with relatively few urinary symptoms, but with the marked general symptoms of a deeply situated abscess.

Acute pyelitis, the most common kidney infection, usually gives little difficulty of diagnosis. It most commonly occurs in children and pregnant women and ordinarily responds to the usual medicinal therapy. Children bear these infections very well. The incidence of acute pyelitis in children must be diminishing with a better knowledge of infant care. In a large children's clinic at the University Hospital in Baltimore, where an average daily attendance in the outpatient department is around 100 patients, relatively few children are found with pyelitis, and still fewer have any lasting effects from the infection in spite of its tendency to recur. Pregnant women with pyelitis in the light of an earlier diagnosis and management seldom have their pregnancies interrupted on its account. Hundley recently reported an interesting situation in pyelitis associated with pregnancy. His pyelograms made during and after pregnancy showed clearly urinary stasis above the pelvic brim during the pregnancy, and a pyelogram of the same patient made after pregnancy showed a release of stasis. His report would indicate that the ureteral and pelvic distention caused by the pregnancy practically returns to normal in a short time after the uterus is emptied. Repeated pregnancies predispose to chronic renal and ureteral infections with a resulting renal deficiency. The symptoms of chronic pyelitis may be most misleading. The infection becomes embedded in the renal and ureteral tissues. The ureters become angulated and tortuous, thus interfering with proper urinary drainage. The symptoms of chronic pyelitis may be very obscure locally, but generally there are manifestations of renal damage. Many of the chronic complaints of women, particularly the obscure abdominal pains, have chronic renal infections as their basis. We owe a great debt of gratitude to Hunner for literally making us recognize this fact.

As long as the urinary drainage is complete there may be few symptoms, local or general. However, as drainage is impaired, constitutional symptoms gradually develop. The prostatic typifies this condition. This type of patient is invariably affected by the slow, continual invasion of the infection which the poor drainage encourages. The obstruction at the urinary outlet is the beginning of a pathology which results in a thickened bladder, tortuous ureters, distended renal pelves, and a heavily infected urinary tract. The kidneys are destroyed so silently in these instances that gastro-intestinal, cardio-vascular or neuro-mental symptoms far outweigh the urinary group of symptoms. It is rather common for prostatics to be admitted to the gastro-intestinal or cardio-vascular clinics in our Dispensary before reaching the urologist. Particularly is this true in those cases where there is a heavily infected residual urine. The toxemia due to renal infection and that due to renal failure can scarcely be distinguished.

The cystoscopic picture in all of these infections is commonly familiar to all of us. The use of the cystoscope for investigation of the upper urinary tract is most essential for estab-

lishing the diagnosis of the infection and the extent of the injury to the kidney by functional tests. Be sure, however, that the renal function is adequate before proceeding with cystoscopy. Intravenous urography has been of enormous help, but should be almost routinely followed by the injected pyelogram.

In the obstructive types of renal infection, notably stone, the symptoms are usually quite definite. The characteristic pain of renal colic is prostrating and hardly to be confused with anything else. Spinal anesthesia has been used recently to control this pain after the usual agents have failed. Paravertebral injection would probably be better.

If the pathologic process progresses, a gradual obstruction to urine drainage takes place and a pyonephrosis results. In this event a tumor may be palpated which may disappear from time to time as the collection of trapped urine drains. The final stage of this process is an abscess of the kidney.

At any time during a kidney infection the fatty capsule may become infected, resulting in a perinephritic abscess. The general symptoms of this concealed abscess are marked. The pain, the fullness of the loin and the pyuria, which usually, but not always, accompany this condition, establish the diagnosis. This process may proceed so quietly at times that no connection with the kidney is suspected and a mistaken diagnosis of psoas abscess of tuberculous origin is made. At operation, if possible, the kidney should be inspected when these perinephritic abscesses are opened for cortical abscesses or carbuncles.

Cases do occur now and then that prove an exception to this general rule of steadily advancing infection in the upper urinary tract. It is really astonishing how long a hydronephrosis can remain so slightly infected as to obscure a diagnosis.

Case 1.—S. R. 73633 U. H. A white male, aged 18 years, was admitted with obscure left abdominal pain. These pains had been coming on since the age of 3 years at intervals of about twice a year. The patient was watched carefully, since his father was a physician. Urinalysis was done at least three or four times a year without any positive findings other than a very occasional pus cell. The attacks of pain would incapacitate the patient for a week or ten days. The pains began in the left upper quadrant, radiated through to the back and to the opposite side, but never down in the urinary tract. The attacks of pain were accompanied by intense headache, nausea and vomiting, cold, clammy perspiration and other symptoms of shock. Examination of the urinary tract was delayed because the boy's mother had had a fatal mishap following cystoscopy. Intravenous pyelograms gave an intimation of a left hydronephrosis, which was supported by an injected pyelogram on June 3, 1931. Left nephrectomy on June 8, 1931, showed a tremendous hydronephrosis with little, if any, kidney substance left.

In 1906 Brewer reported a type of acute hematogenous renal infection which he called "septic infarcts of the kidney." It is what we now know as the septic embolic kidney. He said then "this condition has not received from the profession the attention it deserves." His observation at that time holds good now. The important symptoms of these cases are repeated chills and extremely high temperature. The striking thing is the absence of urinary symptoms and almost complete freedom from tenderness over the kidney on examination. There is nothing to guide one in making a diagnosis except the dry tongue and mounting nonprotein nitrogen of uremia. Repeated examination of the kidneys eventually show sufficient tenderness and intravenous pyelograms point the way to a diagnosis by showing the good kidney to be eliminating all the dye. These patients are too ill to be cystoscoped.

Case 2.—P. F. J. 80144 U. H. A white man, aged 69, was admitted September 19, 1932, with an acute retention of urine from an obstructing prostate. From the time of admission the patient ran a septic temperature ranging between 102 and 104°, associated with mild chills. The physical findings were rather negative. The urine showed a 1 plus albumin and about 15 to 20 cells to the high powered field, which could well be accounted for by the presence of the indwelling catheter. It was several days before a cause for this fever could be ascertained. Eventually some little tenderness, never marked and never noticed by the patient except on deep palpation, was felt in the right upper quadrant. Intravenous pyelography showed practically all the function in the left or good kidney. At operation multiple abscesses were seen scattered in myriads over the cortex of the right kidney.

Another very interesting renal infection is carbuncle of the kidney. Here again the constitutional symptoms overbalance the local. In fact, the absence of urinary symptoms is striking. Only a few of these patients complain of polyuria, dysuria, and hematuria almost never. In Brady's series of 88 collected cases of carbuncle of the kidney, albumin was present in only 19 cases, in 34 the microscopic examination was entirely negative and in the majority of the other cases only an occasional pus cell was found. In the majority of these cases history of recent carbuncle of the skin with sepsis and tenderness in the region of the kidney helps in the diagnosis. Unfortunately these patients are also too ill to be cystoscoped. The pyelograms would hardly be abnormal, since these lesions

are cortical. The function of the kidney, however, is decidedly impaired.

In this short talk it is impossible to go into all the kidney infections, but I cannot close without stressing the early recognition of intrinsic kidney infections. By that I mean the septic embolic kidney and carbuncle of the kidney. For the diagnosis of these two conditions we have to depend largely on clinical observations.

Discussion follows paper of Dr. Fowler, page 601.

TREATMENT OF RENAL INFECTIONS (NON-TUBERCULOUS)*

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The subject assigned to me in this symposium, "Treatment of Renal Infections," is altogether too vast and extensive for adequate treatment in the brief time allotted to this discussion. The most one can hope to do is to refer briefly to a few general principles of treatment and to point out their specific application in certain clinical groups into which cases of kidney infection naturally fall, or for convenience may be divided.

There are certain fundamental conceptions regarding renal infections which it is important always to have clearly in mind. These have been derived from clinical experience, observation and investigation, and appear to be widely accepted at the present time. In a normal state of health the upper urinary tract is sterile. A normal, healthy kidney does not allow the passage through it of living bacteria: when such bacteria are found in the urine obtained from the kidney it is an evidence of renal damage, however slight this may be in some cases. There resides within the kidney a highly developed, efficient defense mechanism against infection, and in order for infection to occur this protective mechanism must break down. The factors concerned in lowering the resistance of the kidney and rendering it vulnerable to invading bacteria are not accurately known. We speak of these as predisposing or accessory causes of infection. An infected kidney is, therefore, an unhealthy, sick kidney in which the normal barrier against infection has broken down and its normal function suffers. Regardless of how the organisms reach the kidney and how they overcome its normal resistance to infection and initiate the series of changes, local and general, which we recognize clinically as renal infections, two distinct types of organisms have been found associated in the process, giving rise to quite distinct changes: distinct as to localization, character or type of lesion produced, and the clinical course which follows. These are the coccus and the bacillus types of organisms, producing the cortical and the pyelitic types of infection. Mixed infections in which both types of organisms are involved in the process complicates the character of the lesion and the clinical picture produced. How renal infection occurs, the changes produced in the kidney, the associated symptoms, and how the condition is recognized have been discussed in the two preceding papers.

Obviously the treatment of any case of kidney infection can be intelligently undertaken with any clear and definite prospect of success only when a thorough study of the case has been made with the object of determining the character of the infection, the anatomical integrity of the infected organ and its functional capacity or ability to do its normal work. This preliminary study must also consider in its survey the demonstration of any extra-renal condition which may have served as an inciting cause of infection or may foster its continuance when established.

We have been chiefly concerned in our consideration of the treatment of renal infections with the repair of the damage done, and the removal of the local cause in so far as this has been possible. Little has been accomplished so far in the preventive treatment of kidney infections. This is due chiefly to our lack of knowledge concerning the exact etiology of the condition and an accurate understanding of the manner in which this occurs. As we view the problem today, it appears well nigh hopeless to expect very much in the development of practical measures of preventive treatment. In the coccus type of infection we do take certain precautions against blood stream infection by our manner of treating localized, superficial, cutaneous suppurative lesions. Squeezing a boil or pimple after incision to dislodge the broken down infected material has been known to be followed by blood stream infection and kidney suppuration. In like manner clearing up of all demonstrable foci of infection may be considered in the nature of preventive treatment of renal infection since we now recognize the important role which such focal infections play in

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the development of kidney infections. And may we not in the same way consider any measure for the prevention or cure of constipation as an important preventive measure in the development of this condition? Colonic irrigation is certainly an important and valuable method of treatment of kidney infection after it has occurred.

For the purpose of our discussion it is convenient to group cases of renal infection as follows:

(1) Infection of a previously healthy kidney.

(2) Infection associated with a demonstrable lesion of the kidney or ureter.

(3) Infection associated with lower tract obstruction.

In order to gain some idea of the frequency of occurrence of cases in these three groups we recently analyzed a series of 215 cases from our private records. In this analysis cases associated with lower tract obstruction are not included. In going over our office records for the past three years we were interested to find that kidney infection was the major condition or an important complication in 10.31 per cent of all cases coming under observation.

In the above series we find 138 cases of infection of a previously healthy kidney; 64 cases in which infection was associated with a demonstrable kidney or ureteral lesion; and 13 cases with associated lesions. We were somewhat surprised to find in this small series that infection in a kidney, presumably previously healthy and at the time of our examination free from any demonstrable lesion other than the infection, occurred more than twice as often as in kidneys damaged by previously existing lesions. In the majority of cases of renal infection, therefore, the problem of treatment is concerned with the eradication of the infection and the removal of such predisposing or accessory causes as may be recognized. These cases comprise the familiar clinical groups of acute and chronic pyelitis or pyelonephritis. Since this type of infection is most frequently encountered and the demand for prompt relief is urgent in order to relieve distressing symptoms and prevent further damage to the kidney, we may consider the treatment of these cases first.

TREATMENT OF ACUTE PYELONEPHRITIS

The symptomatology has been reviewed in the previous paper by Dr. Toulson. These patients are acutely ill. There is high fever of a septic type; loin pain and tenderness varying greatly in intensity; frequently nausea and vomiting, an utter inability to take food and even fluids in sufficient quantity; gas distention; marked vesical irritability, frequency, urgency, tenesmus, pain. They should be in a hospital where only adequate facilities for treatment are available. The indications for treatment are clear: secure free drainage of the kidney, a basic surgical principle in every case of infection; increase fluid intake; promote elimination; and employ urinary antiseptics.

To secure free drainage of the kidney is the most important consideration. In our experience the indwelling ureteral catheter best meets this requirement. We do not hesitate to take these ill patients to the cystoscopy room and place an indwelling ureteral catheter to the pelvis of the kidney. The pelvis may or may not be injected with a warm, mild antiseptic solution. The important thing is to keep the catheter open and draining freely. We have never seen any harm result from this procedure and we have seen repeatedly a prompt subsidence of symptoms follow in a most dramatic way.

Occasionally in unilateral infections we have observed a prompt and dramatic fall of the fever temperature to normal, accompanied by the subsidence of other symptoms following a simple lavage of the infected pelvis with a mild antiseptic solution. Here is such a case:

A young woman seen in consultation in the hospital was running a high septic fever; persistent nausea and vomiting precluded the taking of anything by mouth. She was getting fluids by the Murphy drip when we saw her, looked and felt utterly miserable. A unilateral kidney infection was found and lavage of the pelvis was done, using a 10 per cent silver protein (argyrol) solution. The following morning when we visited her she was propped up in bed enjoying her breakfast. This is the most dramatic result I have ever observed from a single simple pelvic lavage.

We have usually found it necessary to leave the ureter catheter in place for a few days to insure adequate drainage and to allow for repeated lavage of the pelvis as in the following case.

A young married girl was acutely ill with a left-sided colon bacillus infection of five days' duration. On the day of admission, her evening temperature was 104°, there was tenderness in the upper left quadrant, abdominal distention with mild nausea and vomiting. These symptoms had persisted in spite of urinary antiseptics by mouth, forced fluids, catharsis, rest in bed, and a liquid diet. Lavage of the pelvis was followed by a prompt fall in the temperature which, however, did not remain normal. A few days later another lavage was done and the catheter left in the kidney. Again the temperature dropped to normal and remained so, the other symptoms subsided, and on discharge seven days later the urine was sterile on culture.

It frequently happens that patients with kidney infection have been ill for some time before coming under observation. They have been treated in the usual way by rest in bed, liquid diet, internal antiseptics and changing the reaction of the urine with indifferent success. Improvement in symptoms and the patient's general condition is too frequently followed by a recurrence of the fever and other signs of persisting infection. In our experience the infection in these cases is much more apt to be bilateral, although the loin pain and tenderness may be, and often is, limited to one side. Treatment is usually more prolonged; repeated lavage of the pelvis is necessary, together with catheter drainage of the more severely involved kidney.

We do not wish to convey the impression that every case of acute pyelitis should have an indwelling ureteral catheter or pelvic lavage. It is understood that probably the majority of cases of this kind clear up, so far as acute symptoms are concerned, under routine medical treatment. This is particularly true of the acute pyelitis of childhood. But it is our impression that in many of these cases the infection of the kidney persists without symptoms and will crop out later. We are also convinced from personal observation that under the routine treatment usually employed the disease runs a protracted course; these patients are seriously ill for a long time; and there is the added risk that grave renal damage may result. And this leads us to observe that any case of acute pyelitis which does not yield promptly to treatment by the usual methods should have free drainage established by the ureteral catheter.

The next important step in treatment is to increase fluid intake. Nausea usually prevents a normal intake of fluids by mouth. Proctoclysis may be helpful. We prefer intravenous salt solution and 5 per cent glucose. It is important to counteract the danger of dehydration by persistent vomiting and to flush out the kidneys and wash away the products of inflammation. Intravenous medication best meets these requirements. It is positive in its results, acts promptly, and one can measure definitely and accurately the amount of fluids the patient is actually receiving. In our own service it is frequently employed. In acute febrile cases associated with marked nausea and vomiting we usually give 1,000 c. c. of salt solution intravenously once or twice a day to supplement the fluids taken by mouth. It is desirable to keep up the daily fluid intake to well over 3,000 c. c.; 5,000 is better. Glucose in 5 per cent solution may be substituted for the salt solution once a day. It is usually unnecessary to keep up this form of medication for more than a few days, or until the gastro-intestinal symptoms have subsided and the patient can take sufficient fluids by mouth.

I would also remind you of the great value of high colonic irrigations in the treatment of these acute infections. These constitute an important part of the routine treatment. Their value appears to me to be two-fold: it mechanically flushes out the large bowel and removes a large amount of toxic material; and it increases the fluids through absorption which takes place. The value of this form of treatment is generally recognized, but I have a feeling that it is not so generally employed as it should be. Daily colonic irrigation, using at least three gallons of tap water to which may be added bicarbonate of soda if desired, adds greatly to the comfort of the patient by reducing the troublesome gas distention. Lavage of the colon eliminates the toxins which are being constantly absorbed and which form the chief source of infection of the kidneys. A recent observation is interesting in this connection. A young woman from a near-by town was sent into the hospital with the diagnosis of pyelitis. She had been ill in bed three weeks, running a septic fever to 104°. She had been treated in the orthodox way with low diet, forced fluids, and internal antiseptics, but the fever persisted. A routine study disclosed bilateral renal infection without other demonstrable kidney lesion. An indwelling catheter was placed in the left painful kidney, which appeared to be also more seriously infected. Both pelves were lavaged while the left was repeatedly injected through the catheter with mercurochrome. Despite free drainage the fever persisted. After some days and without any other change in treatment, colonic irrigations were started. Immediately the temperature dropped to normal and remained there. This prompt response was most striking and dramatic.

Internal antiseptics are employed as a matter of routine. We have not been impressed with their value in these acute cases where diuresis is so important. Methenamine has not been supplanted in our practice by any of the newer antiseptics, though we have employed the latter in a considerable number of cases. Methenamine is still used as a urinary antiseptic in doses of 5 grains three times a day by many practitioners and without paying any attention to the reaction of the urine; despite the fact that in a dosage of less than 45 grains a day the amount of for-

maldehyde present in the urine is not sufficient to exert any appreciable antiseptic action. And the urine must be kept acid in reaction. In certain cases we have used this drug intravenously and have felt this is a valuable method particularly in those cases where nausea is a prominent symptom.

PRIMARY CHRONIC PYELONEPHRITIS

In the treatment of primary chronic pyelonephritis the same general principles apply. The infection is usually bilateral and in many cases probably represents a late stage of an acute infection in which the clinical symptoms have subsided, but infection of the kidney persists. A history of a previous acute infection of the kidneys can usually be obtained. In some cases, however, the symptoms are subacute from the beginning. Many of these patients lead a placid comfortable life for the most part, unmindful of their sick kidneys except for an occasional flare up characterized by fever, gastro-intestinal disturbance and vesical irritability. In many cases the symptoms are so mild that suspicion of a renal origin is never aroused and the diagnosis of intestinal influenza seems to satisfy all the requirements of the case. The persistence of symptoms, particularly frequency, in spite of the treatment usually employed, finally leads to further investigation and a correct diagnosis. At the other extreme are those cases in which the infection has persisted for years, the kidneys have become severely compromised functionally and toxic symptoms predominate. Between these two extremes one meets with every possible grade or clinical variety.

The treatment of these chronically infected kidneys presents one of the most difficult problems with which the urologist has to deal. An infection which has persisted for so long a time does not readily yield to any form of treatment now available. According to Braasch, the most one can hope to accomplish by thorough treatment is a cure in one-third of the cases; improvement in another third; while a third will remain unimproved. This conclusion was based upon an anlysis of over 2,000 cases.

The importance of focal infections in keeping up infection in the kidneys in these cases has been shown abundantly both clinically and experimentally. Therefore search for and elimination of every demonstrable focus of infection is of paramount importance and should receive most careful attention in the treatment of this condition. Intestinal stasis is the rule. This must be combated vigorously by appropriate measures. Complete daily evacuation of the bowels must be secured. High colonic irrigations are valuable in ridding the large bowel of bacteria and toxic material. They should be repeated at frequent intervals even after the subsidence of fever and continued so long as any infection remains in the kidneys. It is our belief that this constitutes one of the most important measures in the treatment of chronic renal infections. A careful search must be made for other foci of infection, notably dental, tonsillar, sinus and aural. Failure to clear up all such accessible foci doubtless accounts for the persistence of infection in many of these cases, or its recurrence in others. Obviously all dental infection must be removed. Bumpus and others go so far as to advise the extraction of all pulpless teeth, since these have been shown by culture to harbor infection even though the x-ray film is negative.

Infection of the upper respiratory tract frequently precedes the onset of acute pyelitis. Unsuspected focal infections in tonsils and sinuses, unsuspected because quiescent and hence producing no local symptoms, are frequently found in cases of chronic pyelonephritis if a careful search is made. That a definite relation exists between these two conditions is shown by the exacerbation of the kidney symptoms which occurs when treatment of the infected tonsils and sinuses is first instituted. V. Lichtenberg has recently called attention sharply to the importance of focal infection of the prostate and vesicles in the production of upper urinary tract lesions. In certain obscure cases this etiological factor must not be overlooked or forgotten and appropriate treatment should be carried out with the definite purpose of clearing up the renal infection.

In the direct attack upon the chronically infected kidneys one is guided entirely by the data obtained by a thorough routine study of each case. The patients come under observation as a rule during an acute exacerbation of their infection, or a pyuria has been found in the course of a routine examination, usually associated with vesical symptoms, and they are referred for the purpose of determining its source and significance. In any case, the indications are clear and are the same in principle as those governing the treatment of acute pyelitis. Doubtless the most important of these is, as in the acute cases, to provide free drainage. In our experience it is exceptional to find any evidence of obstruction in the ureter. On the contrary, dilatation is frequently seen in the ureterogram. In long-standing, chronic cases narrow-

ing may occur as the result of cicatricial contraction, in which case the passage of a ureteral catheter may be difficult. In certain febrile cases the same happy results may follow the placing of a catheter in the pelvis for drainage as one observes in acute cases. When the pelvis and calyces show narrowing and distortion from extensive scar tissue deposit drainage of the kidney will not be free, despite a widely dilated ureter. However, one must always be certain that there is no obstruction below the kidney pelvis.

The next most important step in treatment is the direct application of antiseptic solutions to the renal pelvis and calyces. Repeated pelvic lavage finds its chief indication in these chronic cases. With good drainage and a fairly normal pelvic outline as shown by the pyelogram, good results may be expected from repeated instillations of such solutions as 10 per cent argyrol, 1 per cent mercurochrome and perhaps best of all 1 per cent silver nitrate. We do not hesitate to make simultaneous instillations into each pelvis in cases of bilateral infection, using silver nitrate on one side only and a milder solution on the other. These instillations must be carried out over a long period in certain cases. The patient's reaction to treatment and cooperation, or lack of it, as well as the results obtained as shown by improvement in symptoms and character of the urine, serve as a guide to how long this form of treatment should be persisted in. The patient who is relieved of symptoms will doubtless decide this question by failure to submit to further treatment, the necessity for which is not otherwise apparent. However, I am sure it is no uncommon experience to see many such patients who have been relieved symptomatically, but whose kidneys are still infected, live comfortably for many years quite unmindful of the fact that they are not entirely well. I am also quite sure that it is impossible to free the kidneys of infection in certain cases no matter how long one perseveres with pelvic lavage together with every other form of treatment at present available. To recognize our limitation in this respect is to spare many of these patients unnecessary treatment which is never pleasant, and is usually disagreeable to say the least. We recently saw a patient who claimed to have had his kidney washed out 412 times! We marvel at his fortitude as well as the patience and devotion of his physicians, but we cannot commend their judgment.

Urinary antiseptics have proven much more useful in chronic than acute types of infection. Methenamine appears to us the most useful and dependable. It must be given in doses sufficient to insure a definite bacteriostatic action in the urine, at least 45 grains a day. We have occasionally given as much as 80 or even 120 grains in twenty-four hours for short periods. This should be combined with biphosphate of soda or ammonium chloride to maintain a constant acid reaction of the urine. Vesical or renal irritability calls for prompt decrease in the dosage of the drug or its withdrawal altogether. Among the newer urinary antiseptics, hexylresorcinol (sometimes marketed as caprykol) has been widely employed. It is more effective against coccus infections. It will allay vesical irritability in many cases and diminish the bacterial content of the urine through its bacteriostatic properties, but we have failed to produce sterilization of the kidneys even after prolonged use. It is not well tolerated by many patients; it is also expensive. Pyridium, a proprietary pyridine compound, is now extensively used for the same purpose. This new drug has seemed to us definitely helpful in allaying symptoms in some cases at least, but we are not convinced that it has any advantages over methenamine, and it costs much more. Like other similar antiseptics, the high color imparted to the urine impresses the patient, perhaps, more than it does the infecting organisms. Our experience convinces us that urinary antiseptics alone cannot be expected to clear up a kidney infection, but as adjuvants in the treatment of this condition they are helpful. More important than any drug, local or internal, in overcoming infection are the measures taken to provide the free, unobstructed flow of urine from the renal pelvis.

Some success has been reported in the use of certain drugs by the intravenous method: for examples, methenamine, neoarsphenamine, mercurochrome, gentian violet and acriflavine. Our experience has been limited to the first two, which we have used in a small series of cases. This form of treatment has not found great favor with us. We have not been convinced of its advantages over other simpler and safer methods of treatment.

In about 3 per cent of these cases of chronic pyelonephritis, surgical interference will be necessary. This necessity arises from advanced unilateral changes in the kidney and ureter. A diffuse infection of the renal parenchyma occurs rarely and may lead to complete destruction of the organ. Such cases demand nephrectomy. Perinephritis due to extension of the inflammation beyond the kidney in some cases leads to the formation of dense scar tissue and such functional impairment of the kidney as to require

surgical interference. Scar tissue deposit about the upper ureter and narrowing of the ureter by cicatricial contraction may result in marked dilatation of the pelvis, relieved only by operation. Rarely secondary calculus formation occurs and must be dealt with surgically. The rare occurrence of this complication is most interesting.

TREATMENT OF COCCUS INFECTIONS

The treatment of coccus infections of the kidney is a chapter by itself. As suggested by Cabot, we are probably more familiar with the severe and more dramatic types of this infection through the contributions of Brewer, who clearly defined the grave unilateral hematogenous infections of the kidney which required early nephrectomy to save the patient's life. Milder grades of infection were subsequently recognized which are successfully treated by drainage of the cortical abscesses. We are all familiar with still another type of coccus infection, the so-called carbuncle of the kidney, which, while relatively uncommon, has been reported in considerable numbers in the literature of the past few years. The treatment of this condition is conservative, consisting in free open drainage. There is reason for the belief that coccus infection of the kidney is rather common; the symptoms may be so mild that the condition is not suspected. These infections clear up under simple routine treatment. Occasionally they run a more protracted course with development of a perinephritic abscess as a complication. This complication is difficult to recognize in its early stages. When finally recognized, the treatment by simple drainage suffices in most cases.

In the second group of cases, those in which the infection is associated with a demonstrable lesion of the kidney or ureter, the infection is usually secondary. Treatment is directed to the removal of the principal or primary lesion, stone, tumor, hydronephrosis, ureteral stricture or whatever it may be. When successful, conservative treatment has been carried out and free drainage has been provided, the most important step in the treatment of the associated infection has been taken. Any residual infection should be treated along the lines already discussed.

In the third group of cases, those with lower tract obstruction, the indications are so obvious as to require no discussion. It may be said that in this group as a whole the renal damage, anatomical and functional, is often grave, particularly in long-standing, neglected cases. The associated infection is only a part of the clinical picture. A complete clearing up of the infection after appropriate surgical relief of the obstruction is hardly to be expected. However, these patients will scarcely ever be reminded of their renal infection, provided free drainage has been established.

DISCUSSION (*Abstract*)

Symposium on Renal Infections, Papers of Dr. LeComte, Dr. Toulson and Dr. Fowler.

Dr. Edgar G. Ballenger, Atlanta, Ga.—I shall devote the short time allotted for discussion to the treatment of renal infections, and especially to the type caused by and associated with back pressure and inadequate urinary drainage.

When I first began to practice urology much was said of the various remedies for the treatment of non-specific urethritis. Gradually, as better methods and new instruments were made for diagnosis, the affections which caused the chronic urethral infection were recognized and many times eradicated. In consequence, when the lesions, especially urethral strictures, are corrected there is no longer any need for the numerous prescriptions for chronic or recurrent urethritis.

Next came a better understanding of the cause of chronic cystitis and the part played by urinary back pressure and inadequate drainage as an etiologic factor. Correct diagnoses and treatment of the causes of urinary obstruction gradually has made most of our prescriptions for chronic cystitis obsolete.

In the course of time back pressure has been recognized also as an important factor in the causation of pyelitis and pyelonephritis. Whether obstructive affections will ever be found to play a part in causing lesions in the substance of the kidney when the source of the infection is at a remote point we are not yet able to say.

Excluding tuberculosis, the prime factor in the management of renal infection, at least of the pyelonephritic type, is correction of stasis. Calculi frequently keep up an infection, but renal tumors do not show such a tendency. We must not get the impression, however, that hydronephrosis and renal or ureteral stones always are associated with or cause pyuria and bacteriuria, for such is not the case, and many errors will be made if this view is held. It is true, though, that the correct diagnosis of surgical affections of the kidney will nearly always be the result of a search for the sources and cause of pain, pus, bacteria and blood.

The most important point in connection with this subject, I think, is to insist that the cause of these findings be properly diagnosed before instituting treatment. In many instances treatment of pyelitis or pyelonephritis will no longer be necessary after the causative factors have been eliminated.

Certainly there will be fewer errors in our work if we always begin our investigations in chronic renal infections with the assumption that there is a definite lesion producing urinary stasis which predisposes to infection and probably causes its continuance.

Such investigations tend to prevent delays which may result from futile efforts with germicidal agents. These delays often result in minor affections becoming major ones. Small calculi, perhaps not casting a shadow, may be allowed to reach a size requiring major operative procedures. Hydronephrosis, in need of dilatation of the ureter, may be allowed to result in insidious and

serious damage to renal function; while malignant and tuberculous lesions may be allowed to become hopelessly extensive.

What I have said I know seems trite and even superfluous at a meeting of urologists. Hardly a week passes, though, that I do not see definite urologic lesions which have been overlooked by good medical men as well as by urologists simply because they have not taken the trouble to make reasonable investigations. Even when we are on the alert for elusive affections, we not infrequently find ourselves humiliated by something we have failed to recognize.

Finally, let me urge that we make adequate diagnoses by carefully and properly timed urologic methods, and that every effort be made to recognize and correct beginning troubles, wherever possible with minor methods, before they become major ones. This cannot be accomplished by guessing the diagnosis.

Dr. Nelse F. Ockerblad, Kansas City, Mo.—Whatever we may believe regarding the route of invasion of kidney infections, stasis of urine in the kidney pelvis and ureter due to obstruction is probably the most important factor. I am quite of the opinion that the respiratory tract infections are responsible for as many kidney infections as they are for intestinal disturbances. Many persons with chronic pyelonephritis regularly have exacerbations of their disease following respiratory tract infections.

Dr. Toulson has ably described the symptomatology and diagnosis of renal infections. The two most valuable symptoms and signs are undoubtedly pain and hematuria. Either one of these two bring the patient post haste to the doctor. Pyuria is frequently not accompanied by pain or discomfort and thus it happens that unless the patient is subjected to some routine examination like an insurance examination, the trouble is not discovered until the terminal stages.

Seemingly settled questions need to be revived and discussed frequently because we are all apt to forget what we once learned. Dr. Fowler's vast experience gives him the right to speak with authority upon a subject that has become a commonplace routine with most urologists. The idea of relieving acute ureteral obstructions with the ureteral catheter and the treatment of renal infections by providing adequate drainage cannot be too often stressed.

Dr. Linwood D. Keyser, Roanoke, Va.—It is well known that hexamethylenamine is inert as an antiseptic unless the urinary reaction is maintained at an acid level of pH 5.5 or above. Yet how often do we see this drug administered with a small amount of sodium acid phosphate or of ammonium chloride without any effort to check the urinary reaction? At the present time the determination of the hydrogen-ion concentration of the urine has become a simple office procedure. Using such an apparatus as the LaMotte urinary reaction indicator with color comparison cards, the determination can be made in one minute or less within a 0.5 point range. For increasing the urinary acidity ammonium nitrate in enteric coated capsules is available and usually satisfactory. Recently I have used nitrohydrochloric acid in doses of ten drops every three or four hours well diluted. This is well tolerated and effective as a urinary acidifier.

The ketogenic diet developed by Helmholz, Barborka and others is being employed as a therapeutic agent in bacillary infections, especially in the Urologic Section of the Mayo Clinic. Excellent results have been reported. Helmholz feels that the ketosis produces in addition to the elevation of urinary acidity a substance in the urine which is highly bactericidal to bacilli. I will not enter into a discussion of the details of the ketogenic diet. They are amply outlined in current articles by Helmholz and Barborka and an excellent epitome of this regimen is found in Bumpus' recent monograph on "Minor Surgery of the Urinary Tract." My experience with the ketogenic diet is limited to 4 cases of bacillary infection which made a prompt immediate favorable response.

The staphylococcal infections are most resistant and vary in type from chronic pyelonephritis to miliary abscesses, renal carbuncle, and the fulminating infection associated with infarction. Radical surgery is indicated in the more fulminating types of infection. Most perplexing are the chronic varieties of staphylococcus infection. Here intravenous medication with mercurochrome is perhaps worthy of trial. In my experience, neoarsphenamine is more efficacious. In using either drug, we should start with small doses. Treparsol tablets are advocated by some. Alterations in the urinary acidity are of little value. Repeated and persistent cystoscopic lavage with gentle and graded dilation of the ureter has given me the best final results in treating chronic staphylococcic infections. It must be emphasized, however, that unless the procedure is repeated at intervals of two to four months over a period of several years, exacerbation of the infection will be all too frequent and the patient will find himself in a state of chronic invalidism.

Dr. Rex E. Van Duzen, Dallas, Tex.—I was very glad to hear Dr. LeComte mention the disturbance of motility in the urinary passages during acute infections. Whether this is due mainly to edema or to toxic effect on the nerve endings is debatable. Stephenasco-Galatzi believe the toxins produce a temporary paresis of the ureteral muscle. I believe Dr. LeComte is correct, that most infections reach the kidneys by the hematogenous route in the adult. However, in children I believe the ascending route accounts for many cases. I do not know how to account for the prevalence in female children unless we accept the ascending route.

Is *B. coli* infection secondary to a coccus infection? Cabot has observed *B. coli* in the urine of patients with streptococcic sore throat and believes the original renal infection is due to the streptococcus which is later replaced by *B. coli.*

I cannot agree with Dr. Fowler that we should pass an ureteral catheter in an acute renal infection. I will grant that many respond nicely, but in an occasional case the reaction is terrific. If we have a *B. coli* infection, it is usually safe to catheterize, but in the coccus infection, wait until the patient has developed a partial immunity.

Dr. Toulson (closing).—It is evident from the discussion here today that there can be very serious renal damage without commensurate findings in the urine. I think this is something that we do not stress enough.

A SURVEY OF THE PRESENT STATUS OF ENDOCRINOLOGY IN ITS RELATION TO DERMATOLOGY*

By JACK W. JONES, M.D.,
and
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The field of endocrinology with its maze of unknown glandular fascinations and its intricate complexities beckons appealingly to one's imagination. But even the most cursory survey of the massive literature on the ductless glands becomes a difficult undertaking and one is amazed at the lack of known facts and the great deal of assumption based on deductive speculation.

Since the very beginning of endocrinology the physician has utilized the presumed effects of the ductless glands rather recklessly and his shotgun therapeutics have been founded more on hope than intelligence. Thus it has appealed to the fancy of many to explain a wide range of dermatoses as diseases of the ductless glands, often on a purely theoretical basis. Most of the dermatoses so explained have been placed in the endocrine category merely for lack of evidence of any other etiology. However, in these statements one must not read a complete failure to find definite endocrinological manifestations. Step by step over numerous stumbling blocks of contradictory data those seriously interested in the subject have defined both the clinical and experimental conditions associated with multiglandular hyperplasias and atrophies. The method of progression has been somewhat as follows: an unusual clinical syndrome has been described with sufficient exactness to allow its recognition by others and in course of time it has become associated with tumors or disease of certain glands. Removal of the disease or tumor has brought relief and experimental data on animals have substantiated the findings. Thus the complete syndrome is delineated.

The founders of dermatology had little difficulty in explaining the cause of skin diseases since it was a self-evident fact that they all represented poorly mixed or deteriorated humors of one sort or another. The histopathological and bacteriological epochs brought new and more exact methods of explanation and it was natural to neglect the endogenous or "humoral" causes. But we are now in an era which necessitates detailed and complete observation of the individual as a whole, and with repeated recapitulation, reading our results in human changes, treating the patient individually according to his personal needs. Fully to understand the changes due to endocrine abnormalities one must assume a chemico-pathological attitude rather than a histopathological attitude, because diseases of the ductless glands are due more to secretory wrongs rather than cellular changes, their nature not being dependent on the size or position of the gland. The glands of internal secretion produce hormones which, when disseminated to distant organs and tissues effect such a profound influence on their function and appearance that these glands at once become essential to life. Their actions are so manifold that they must of necessity overlap and interact to form the pure skein of metabolism, and minor variations in their function become the essence of human diversification.

Since the skin changes observed in the well defined thyroid and pituitary dyscrasias are only a part of the whole syndrome our dermatological remarks must be more or less general. Excessive thyroid function produces an increase in metabolism. The skin becomes a part of this and thus we find a soft, pink, easily flushed, and moist skin often accompanied by excessive perspiration. Diminished thyroid function is the antithesis of this state and we see a heavy, thick, dry skin sometimes associated with a complete lack of perspiration. Between these extremes there are variable graduations within which we find the normal. Recent studies have confirmed the growing opinion that the changes once associated with hyper and hypopituitary states should be considered as two different hypersecretory states. Thus hyperpituitary basophilism results in gonadal disturbances and hyperpituitary acidophilism results in acromegaly and gigantism. In the former state in the adult individual we find a more or less sudden hypertrichosis, heavy, dry skin, livedo reticularis and purplish striae, to which we will refer later. In the preadolescent female with pituitary basophilism we often see the thin anemic skin of cachexia. Pituitary acidophilism results in gigantism and acromegaly, in which state the skin is thick, heavily wrinkled and furrowed often with an excessive seborrhea due to hypertrophy of the sebaceous glands.

*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

Besides these changes the following dermatoses have at one time or another been assumed as caused by, or associated with, some type of endocrine imbalance; psoriasis, scleroderma, alopecia areata, various pigmentations and depigmentations of the skin, acne vulgaris, acne rosacea, various unknown herpetic and bullous eruptions, icthyosis, hypertrichosis, erythrocyanosis cutis symmetrica, acrodermatitis chronica atrophicans, poikiloderma atrophicans vasculare and Fox-Fordyce syndrome.

Psoriasis is a disease of so many contradictions that it is not surprising that some should grab blindly at the ductless glands for help in tracing its etiology and treatment. Its association with the thymus gland has been the subject of much speculation, but with a surprising lack of supported fact. Most of the reports deal with its cure or alleviation by giving thymus extracts or thymic irradiation unsupported by any data that might determine a supposed thymic disorder. At the present time there is no evidence either for or against the theory that the thymus has any internal secretion. Any conclusions of the effect of thymus irradiation or thymus extracts on the course of psoriasis must of necessity be considered false until proven otherwise.

A study of the relation of scleroderma to the endocrine glands is not convincing one way or the other. Numerous reports have been made illustrating its appearance in individuals with other evidence of hypothyroidism, some claiming improvement under therapy with desiccated thyroid gland. Some have blamed ovarian insufficiency and finally its endocrine etiology has been cast in the dumping ground of "pluriglandular dyscrasias." At the time many of these reports were made endocrinology was in its infancy and treatment with impure and often useless glandular extracts was very uncertain. One therefore must conclude that scleroderma has many supposed etiologies, the least proven of which is endocrine imbalance.

It is entirely possible, but in the light of our present knowledge somewhat improbable, that the pituitary body may be acutely stimulated or depressed, and, in that state produce localized skin disease. Such an explanation could only be used in explaining the etiology of alopecia areata on the basis of pituitary dysfunction. While it is true that in some pituitary dysfunctions there occurs a lack of hair it is always associated with other developments of the dysfunction. Treatment of alopecia areata with pituitary extracts is highly empirical and one must be careful in evaluating any good results that might have occurred coincidentally.

Abnormal pigmentations of the skin have occurred in the course of nearly all of the well defined hormonal syndromes. There is a definite belief among most authorities that all these pigmentations may be traced directly to some disorder of the cortex or chromaffin portion of the suprarenal glands, the disorder often being secondary to disease of other internal secretory glands. Thus in the pigmentary exaggerations that occur in pregnancy and at the menses, of which chloasma is an example, although by association, apparently stimulated by ovarian hormones, the pigment deposit *per se* is due to the action of these hormones on the suprarenal tissue. These abnormalities of pigmentation include chloasma, acanthosis nigricans, Addison's disease, pigmentations associated with hyperthyroid disease, myxedema and pituitary basophilism. On the other hand, the clinical antithesis of pigmentation, vitiligo, has never been definitely shown to have any relation to the glands of internal secretion beyond an assumed indictment based on lack of another etiology.

The term acne vulgaris should delineate a syndrome composed of two phases: first an excessive seborrhea, complicated secondly by sebaceous plugging and consequent infection. This syndrome is almost always associated with puberty, and its appearance at or around this period places it at once in the category of endocrine disorders. But is it a disorder? The findings of Bloch support the hypothesis that acne in its strictest sense is a physiologic process apparently produced by the same internal secretions that influence the appearance of the menses and the growth and distribution of the pubic and axillary hair. Its final phase, however, is undoubtedly pathologic. So far no treatment with glandular extracts has proven to be of any definite value, and at any rate, it would seem unwise to attempt the relief of a minor phase of physiological development by a change in the whole physiologic process. While acne rosacea is observed quite often in company with the menopause and in senility it is by no means confined to these periods of

life. Although a gonadal underactivity may be a factor in this condition, it must be an associated phenomenon rather than an actual cause.

Bullous and herpetic eruptions have been described as recurring in the course of each menstruation, most often during puberty, associated with an amenorrhea. But the isolated cases reported have been so varied in their clinical manifestations, and with so little supporting data, that one is unable to account for these experiences by an endocrine hypothesis. In this indefinite group the rare disease known as impetigo herpetiformis may well be included. Although it occurs during pregnancy, there is much more evidence to support an infectious etiology rather than any endocrine upset.

Because some cases of icthyosis improve under prolonged administration of desiccated thyroid, we have been led to assume that this disease is caused by a thyroid deficiency. We have been unable to collect any undoubted evidence as to thyroid deficient states as the cause of icthyosis. It is probable that the good performed by the desiccated thyroid medication depends largely upon its ability to increase the metabolism of the skin, thereby promoting a transient seborrhea, and not upon its supplanting a lack of thyroid tissue.

Hypertrichosis is a major evidence of the human diversification brought about by variations in the function of one or more of the endocrine glands. It has occurred in hyperpituitary states, especially in the female, in hypopinealism, hypergenitalism, and hyperfunction of the cortex of the suprarenal glands. However, observations on the dysfunction of these glands cause a doubt in one's mind as to the sole influence of any one of these glands in producing the clinical syndrome attributed to them. Recent observations (Cushing) are indicative that these syndromes are manifestations of disorders of many glands probably motivated by a single glandular secretion. More and more our attention is directed to the pituitary body as the basic cause of hypertrichosis. But its hypertrichotic influences vary widely as to sex and it is quite possible that the gonadal secretions play a major part in its appearance.

Attention has been directed to the fact that vascular disturbances of the extremities resulting sometimes in erythrocyanosis cutis symmetrica, and possible acrodermatitis chronica atrophicans have been repeatedly observed in individuals showing other stigmata of endocrine dyscrasia. The endocrine origin of these two disturbances as well as the variable syndrome poikiloderma atrophicans vasculare was rather forcefully implied by Bloch in a recent report of cases of hypogonadism and hypothyroidism. The appearance of erythrocyanosis cutis symmetrica with ulcerations of the skin of the legs accompanied by purplish abdominal striae in pituitary basophilism and suprarenal cortex tumors is strikingly in favor of the endocrine origin of these rather indefinite skin complexes. However, we cannot definitely place these conditions in the endocrine category on such hypothetical evidence.

Of all the diseases of the skin which may be indicted as having an endocrine background, the Fox-Fordyce syndrome comes nearer to being a specific endocrine disorder. It has been shown that this condition is invariably associated with a disorder of the apocrine glands. It is also a well established fact that the apocrine glands as distinguished from the eccrine glands (sebaceous glands), are a part of the secondary sex cycle, more useful to animals than man in that they secrete the odors associated with estrus. Some of the cases reported have had exacerbations of itching at or around the menses that have been relieved by ovarian extracts. It has been considered as occurring in disordered ovarian and thyroid states.

As far as the dermatological manifestations of endocrine disorders are concerned, we must conclude that the great majority of these manifestations are only one of the signs (usually minor) of a generalized symptom complex. With the possible exception of the Fox-Fordyce syndrome, treatment with glandular extracts lies in the hands of the endocrinologist or internist, since as yet there is no definite reason to assume that glandular extracts have any specific effect in ameliorating any dermal pathology. It is quite evident from even a cursory review of endocrinology in its relation to dermatology, that as a whole we have allowed our enthusiasm to overbalance our proper appraisal of facts, and we have been wandering in a therapeutic desert guided by clinical mirages.

As yet our knowledge of the endocrine dyscrasias is surprisingly small, especially surprising when we consider the mass of human disorders which may by clinical experience suggest an association with an infinite number of glandu-

lar combinations. The differentiation of abnormal from normal is difficult and many of the hormonal syndromes can now be considered a part of the scheme of human diversification so intimately bound up in the endocrine system. This is exemplified in the syndrome of acne in which the basic process is probably physiological rather than pathological. In the future the road to more definite knowledge of the ways of the endocrines must lie in the repeated recording of the observations and examinations of the individual followed by sane elimination of the unsupported facts. It is only by these methods that endocrinology can pass from empiricism to the higher plane of rational therapeutics.

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DISCUSSION (*Abstract*)

Dr. S. S. Marchbanks, Chattanooga, Tenn.—It is very gratifying to know that Dr. Jones advises a safe and sane attitude of not expecting too much of gland therapy in dermatological conditions.

HIRSCHSPRUNG'S DISEASE: ITS PATHOLOGICAL PHYSIOLOGY AND APPARENT CURE OF TWO CASES UNDER OBSERVATION FOR TWO AND THREE YEARS FOLLOWING SYMPATHECTOMY*

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Hirschsprung's disease could rightly be defined as congenital enlargement of the colon without demonstrable obstructive lesion, with consequent obstipation and its train of symptoms. Hirschsprung described the condition as an idiopathic megacolon.

Various classifications have been given, including congenital, mechanical, neuropathic, and inflammatory. We prefer to classify Hirschsprung's disease as neuropathic or mechanical. The mechanical category includes all pathological changes which would involve the size of the lumen of the gut whether due to inflammation, constriction, or any other occlusion. Thus, if we really accept the more recent ideas on this subject, all true Hirschsprung's is congenital and of neuropathic origin.

True Hirschsprung's disease is rather rare. In the ten-year period from 1920 to 1930 there were only five cases on the records of the Royal Infirmary of Edinburgh.[1] Walton[2] reports that from 1900 to 1909, out of the 131,000 admissions, there were only 4 true Hirschsprung's. The Mayo Clinic[3] reports from January, 1908, until 1930 there were 76 cases; 11 of these were proven to be of secondary type, 62 of idiopathic type, and 3 of the acquired type, secondary to carcinoma. The Pediatric Service of the Memphis General Hospital and Baptist Memorial Hospital has shown 18 cases of megacolon in the last twenty years.

Historically this condition is not new. The earliest cases on record were reported by Parry[4] in 1825 and Billard[5] in 1829. Von Ammon[6] later reports two cases in the very young, one being in a fetus of seven months, and the other in a child who died soon after birth. The

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first report in American literature was by Lewitt[7] in 1867. Hirschsprung presented his monograph in 1886, and it is very interesting that we have made but little advance in etiology and treatment from 1886 to 1927, even though in 1908, when Finney and Fisher[8] reviewed the literature, they found more than two hundred articles on this subject. There is considerable controversy as to whether Hirschsprung deserves the credit for the first description, though, undoubtedly, he gave the first clear conception of this condition in the literature. Males seem to be involved much more than females. In our series of 18, 12 were males.

The tube which forms the bowel grows very rapidly after the seventh month. We know, also, that at this time the fetus begins swallowing mucus and peristalsis is induced. We are also told that in the embryo there are five points of fixation in the intestinal tract, namely: (1) the esophageal cardiac junction; (2) the pyloric duodenal junction; (3) the duodenal jejunal junction; (4) the splenic flexure; and (5) the recto-anal junction. While there are other points where there are fixations, the five named are constant points and these are the situations at which we find most obstructions of the bowel. From the above facts it would seem reasonable that an imbalance of the autonomic nervous system along the intestinal tract might easily produce the various conditions such as cardiospasm, pyloric spasm, intussusception, ileocecal stenosis, and spastic constipation.

In 1927 a new theory of the etiology of Hirschsprung's disease was promoted by Wade and Royle,[9] assisted by the physiologist Hunter, of Sidney, Australia. This theory was suggested by observations in a series of operations for congenital paraplegia in which bilateral lumbar ramisections were performed on 13 patients, all of whom had spastic constipation. Great relief of spastic constipation resulted in 11 of the 13 cases. As a result, Wade and Royle were led to believe that primary megacolon was due to an imbalance of the autonomic nervous system, the holding nerves predominating over the emptying nerves.

The innervation of the intestinal tract consists of the intrinsic plexus which carries on the motor function of the intestinal tract plus the superadded effects of the autonomic nervous system, an accelerating influence through the parasympathetic set of fibers (vagosacral) which increase peristalsis and relax the sphincters, and a slowing or inhibitory effect, interfering with the movement of evacuation of contents of the bowels through the sympathetic fibers (thoracicolumbar) which inhibit peristalsis and tighten the sphincters.

There is also normally a voluntary control over the intake and preparation of material at the top of the tract and of time and place of evacuation through the several spinal nerves. In Hirschsprung's disease the "brakes drag."

In certain individuals there is an imbalance between the systems controlling the lower bowel and sphincter, resulting in the more or less complete absence of defecation. As a result of this lack of power of defecation, there is an accumulation of an enormous quantity of fecal matter in the colon.

The colon is enormously distended with thick muscular walls. Cases have been reported where the circumference was 43½ inches and the diameter 20 inches. In another case, 47 pounds of fecal matter were reported evacuated mechanically from one distended bowel.

The two muscular coats are equally thickened. The mucous membrane is stretched and smooth and often shows areas of ulceration which may penetrate the walls. These ulcers develop from irritation by the impacted feces.

The most common site of involvement is the sigmoid, but frequently the entire colon is involved and dilatation and thickening often extend into the small bowel. The omentum and mesentery are usually quite vascular and very much thickened with enlargement of the lymph nodes.

The clinical syndrome usually seen is that of a pale, undernourished infant or child with an extremely large abdomen. The extremities are usually thin and emaciated. There is usually a history of constipation, increasingly severe since birth. Instances have been reported in which there has been no evacuation of the bowels for a period of weeks or even months. Cathartics seem to have little or no effect. High enemas will produce a movement sometimes enormous in amount with foul smelling odor. This movement may be thick or sometimes quite thin; the thin material trickling by the heavy thick mass. After the passage of one of these large movements the abdomen becomes very flaccid. As one mother described it, the abdomen wrinkled up like a dish towel. Examination over the abdomen usually shows marked peristalsis. These children are prone to ob-

struction of the bowels due, of course, to the thick vascular mesentery and omentum.

One characteristic of the symptoms is that these children show little toxicity even though the bowels may not move over an extremely long period. In many instances these children seem to lose entirely a desire for defecation.

We agree with many authors that the type of megacolon occurring later in life is usually the result of exaggerated constipation, or coprostasis, and is often due to mechanical obstruction, or atony of the bowel. That in some instances it may be a mild type of congenital megacolon, which is gradually exaggerated and does not appear until later in life, is worthy of consideration.

The diagnosis, outside of a definite clinical picture, is very much assisted by the x-ray. Barium enemas will demonstrate, as a rule, the enormous size of the colon.

Spinal and sacral anesthesia as first described by Cassiday and Salkin[10] are of value in differentiating the nervous from the mechanical obstruction and also may assist in determining the type of treatment. The conditions which should be particularly differentiated are those which produce a large abdomen, such as rickets, chronic intestinal indigestion, or chronic ileum, tuberculous peritonitis, volvulus, carcinoma, intestinal dysentery, ulceration, various cysts, or other types of tumors or obstructions.

The treatment of this condition until recently was divided into medical and surgical.

The medical treatment, of course, consists in the usual therapeutic agents employed in chronic constipation, enemas, rectal tube, massage, electricity, tonics, exercises, and diet. Cathartics, in our hands, never have been beneficial, and we believe in most cases are harmful unless used very judiciously.

The surgical treatment until recently has consisted largely of evacuation of contents of the bowels by enterostomy in case of emergency and by section of the bowel, as colectomy.

These procedures as taken from Finney's[11] article have given the following results:

Cases treated medically	59	Cases treated surgically	44
Died	39	Died	21
Mortality rate 68 per cent		Mortality rate 48 per cent	
Improved	9	Improved	7
Unimproved	4	Unimproved	2
Cured	7	Cured	15
Recovery rate 12 per cent		Recovery rate 54 per cent	

There are instances where complete colectomy has been followed within two or three years by a return of the original dilatation and hypertrophy of the colon, which would seem to indicate the important part played by the neuromechanics which control the lower segment of the bowel.

With the treatment of the condition in this unsatisfactory state, the observations of Hunter and Royle[12] on the relief of spastic constipation by lumbar sympathectomy direct the attention of the profession back to the autonomic nervous system as a means of control. Hunter and Royle's cases of spastic paraplegia were not relieved, but its accompanying spastic constipation was cured.

Wade[13] applied lumbar sympathectomy to Hirschsprung's disease with striking results. Adson[14] later reported two cases: one of true Hirschsprung's disease and one of atonic constipation, in which he had done lumbar ganglianectomy. The Hirschsprung's case was benefited at once and the atonic constipation improved but little if any.

Learmonth[15] was led by the work of Kuntz[16] and by investigations of his own to limit the nerve interruption to the inferior mesentery plexus and presacral nerves, a procedure which gives equally good results without sacrificing vasomotor control of the legs.

Three other cases have been reported recently from the Mayo Clinic in which success followed this limited procedure. We are adding two more cases, one in which the inferior mesentery plexus and presacral nerves were cut and another in which only the presacral plexus was resected. Both of these cases were immediately relieved and have remained well for nearly three and two years, respectively.

Normally the lower bowel acts as a reservoir. For performance of this function, peristalsis is inhibited and the internal sphincter held in contraction by the action of thoracolumnar outflow through the fibers of the inferior mesenteric plexus, and the internal sphincter is kept in contraction by the presacral nerve, both parts of the sympathetic system.

These two sets of nerves thus compose the holding nerves of the bowel and are reinforced, when necessary, by the constriction of the external sphincter, innervated in part by the voluntary nerves of the cerebrospinal system.

In the act of defecation the detrusor effects of the peristaltic action of sigmoid and rectum carried on by the enteric plexus are reinforced by the action of the sacral outflow (parasympathetic) which also inhibits the sphincter action, thus constituting the emptying set of nerves.

Thus, the sympathetic and the parasympathetic fibers are both inhibitory and motor; each serve a function which calls in both of these effects.

In Hirschsprung's disease there is a congenital imbalance. Whether this is due to overaction of sympathetics or underaction of parasympathetics is not known. However, the power of emptying the bowels is regained by blocking the holding nerves.

The great muscular hypertrophy of the colon and visible peristalsis are evidence of more than adequate expulsive power. A functional obstruction is indicated by the inability to defecate, with enormous accumulation of fecal matter and abdomen tightly distended with gas.

Morton and Scott[17] have used the test of spinal anesthesia to presage the effect of cutting the sympathetics. This relaxes the inhibitory effects upon peristalsis and allows sphincter relaxation, with rapid emptying of the bowel. We have used spinal anesthesia in our cases, both as a test and also an aid in unloading the colon preoperatively.

The injection of the lumbar sympathetic chain with procaine hydrochloride (novocain) by the technic of White[18] in testing cases of Raynaud's disease and thrombo-angiitis obliterans may prove to be equally satisfactory. Other factors which affect the sympathetic and parasympathetic balance in favor of the parasympathetics are eserin, pituitary extract, hypertonic salt solutions, and insulin. The general acid-base balance also influences the autonomic balance; the acid side favoring parasympathetic action.

From studying the peristalic action of the descending colon and sigmoid, preoperatively and with the abdomen open, it seems improbble, in these two cases at least, that abnormal inhibition of peristalsis was present, and we were led to limit the interruption of sympathetic fibers in the second case to the presacral plexus. In this case the colon had diminished in size, as shown by the roentgenograms. This seems to indicate that cutting of the inferior mesenteric plexus is not necessary to diminish dilatation of the colon as suggested by Learmonth,[15] but that the enlargement will diminish following relief of functional obstruction just as it does in the gut above a mechanical obstruction following the relief of the mechanical obstruction. The enlargement of the lumen and hypertrophy of the walls have occurred as a response to obstruction and the anatomy later readjusts itself to the change in function.

Case 1.—I. L., age 4 years, was referred to the Clinic by Dr. Eugene Johnson October 7, 1930. At two weeks of age enlargement of the abdomen was noticed. The child had been constipated from birth, the bowels only moving every three or four days and then only with enemas or other artificial means. The abdomen continued to enlarge in size very rapidly. At ten months of age the child developed high fever and the mother stated that at this time bluish spots appeared all over the abdomen. There was complete obstipation. No gas was passed even with repeated enemas. Physical examination showed tenderness and rigidity over the entire abdomen. An exploratory operation was made and an adhesive band said to have been found, but there was practically no relief. Following this operation obstipation continued until the child was brought to the Clinic at the age of four years.

First physical examination at the Clinic showed a small, undernourished child, weighing 32 pounds before an enema was given. The muscles were flabby and he was extremely emaciated. The abdomen was enormous in size; was very tight with marked peristalic movements over the surface. An enema was given and an enormous stool, dark in color with foul odor and normal consistency, was obtained. The blood examination at this time was negative, except for a slight secondary anemia. The urine was negative. A roentgenogram made after giving barium by enema showed an enormously distended colon. Spinal anesthesia administered at this time was followed by a free movement of the bowel and with this factor in mind it was decided that section of the parasympathetic fibers would probably be of value.

Operation November 7, 1930.—Under ether inhalation a midline incision was made from the umbilicus to the

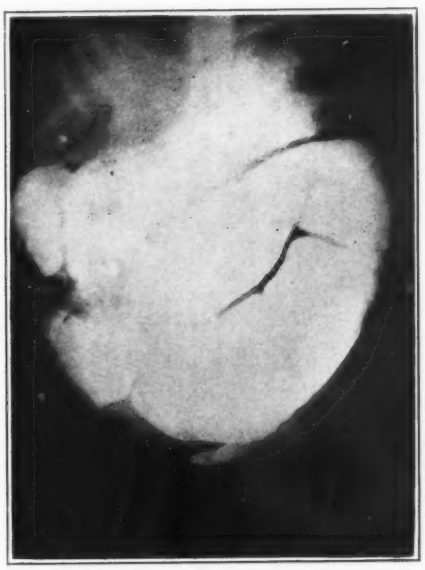

Fig. 1
Immel, Lloyd. Megacolon or Hirschsprung's disease. Picture taken before operation.

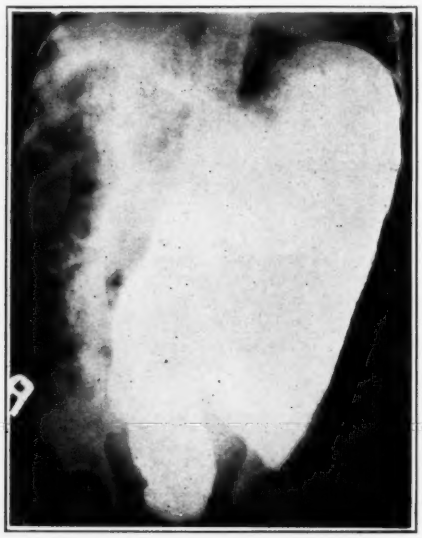

Fig. 2

Immel, Lloyd. Megacolon or Hirschsprung's disease, April 7, 1931, six months following operation. Note difference in rectum.

symphysis. The colon was greatly enlarged from the cecum to the rectum. Its walls were thick and it contained a large quantity of fecal material. A considerable quantity of fluid material was evacuated by means of an abdominal suction apparatus extended high into the colon through the rectum. The presacral nerve was plexiform in this case. It was exposed and resected, including its lateral and descending roots, for a distance of a centimeter. The continuation of the presacral nerve into the aortic plexus was traced up to the inferior mesenteric artery, where five nerve filaments pass into the mesentery with the artery. These filaments were cut and removed, together with the intervening preaortic plexus. Closure was without drainage, interrupted silk being used throughout, bearing in mind the tremendous abdominal distention observed

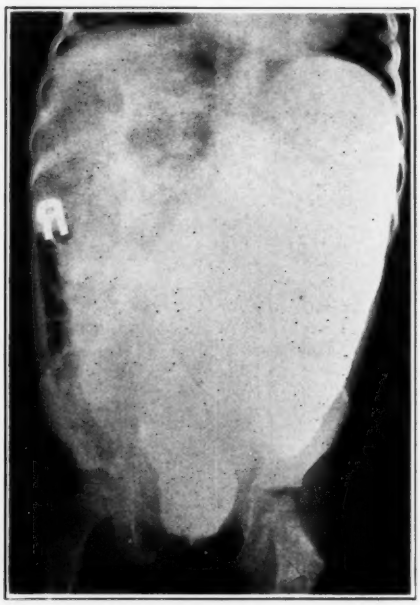

Fig. 3

Immel, Lloyd. Megacolon or Hirschsprung's disease. One year following operation. Has had two movements daily. Health perfect in interval.

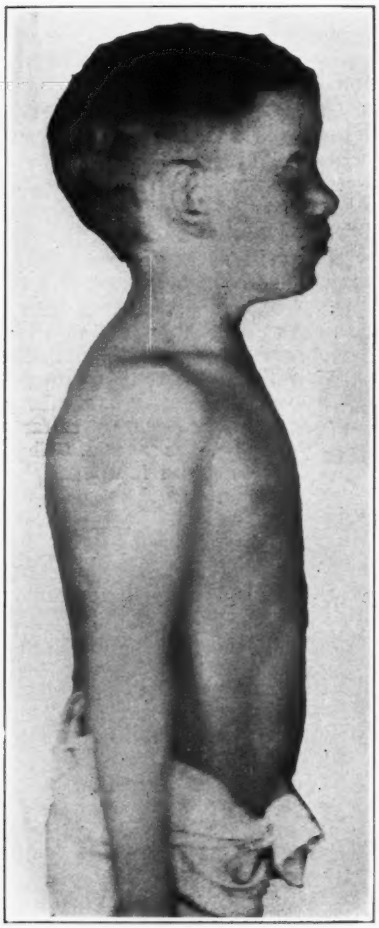

Fig. 4

Immel, Lloyd. Age five years. Megacolon or Hirschsprung's disease. Two years after original operation on the sympathetic nerve fibers.

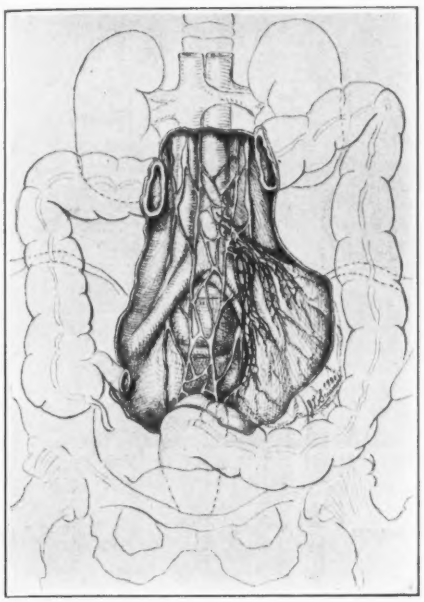

Fig. 5

Drawing. Inferior mesenteric and sacral plexus of sympathetic nervous system. Schematic drawing.

before operation. The postoperative condition was good and abdominal distention did not recur, the abdomen remaining soft. During the remaining period in the hospital the child had spontaneous bowel movements daily the first few days, but was given enemas in order to expel the fecal matter. The child was next seen January 26, 1931, or three and one-half months after the first examination. The mother stated that since the operation the child had been having one and sometimes two normal stools daily. The appetite had been good. He had gained in weight. The abdomen, as can be seen in the picture, had diminished in size. The accompanying roentgenogram shows little if any change in the size of the colon. There appears to be less constriction at the recto-anal junction.

The next examination was made April 7, 1931, or five months after the first operation. The general health during this last period had been excellent. The child had had one movement or more daily and had not had an enema of any kind since leaving the hospital. The mother had given what is known as "black draught," or a preparation of senna, with occasional doses of mineral oil. He still had no inclination whatever to move the bowels spontaneously. This is probably just a pathological response to normal physiology, as we all know that emotions affect evacuation of bowels very materially. He has gained in weight. The movements are now very much like those of a normal child. One striking feature is that after eating he becomes distended with gas for one or two hours, the gas passing only when sitting up or standing.

The next examination was made February, 1932. The condition was very much improved. He is still gaining in weight. He still has a normal movement when told. Roentgenogram shows little if any change in the size of the colon.

The last examination was made November 7, 1932, or approximately two years after the operation. The musculature appears to be very much improved. The muscles are firm. The child is much more active. His weight at this time was 41½ pounds. The height is about normal for his age. The abdomen is still a little bit larger than normal. The bowels move twice daily, but he still has no inclination and has to be sent to the toilet. A glass of milk was given while in the Clinic and, as the photographs taken before and after eating will show, there is still considerable gas, particularly high up in the abdomen.

The only cathartic given has been mineral oil, two tablespoonfuls daily. His mental attitude plays a considerable part in his ability to evacuate the bowel. The mother states that after he has been scolded it is sometimes a day or two before he responds regularly. About once a month an enema becomes necessary; not oftener. It is also interesting to note that a very small enema will now produce satisfactory results.

Case 2.—B. V. S., age 5 years, had been markedly constipated since birth; her bowels sometimes went for weeks without moving. From birth she had had a very large abdomen. She became acutely ill three days before she was admitted to the hospital. At the time of admission she had 103.5° of fever and was in coma. She had vomited all one night and one day prior to admission. Cathartics and enemas seemed to have no effect. Her abdomen was found to be so markedly distended that no physical findings could be elicited. After attempting one high enema with no results, the condition of the child was so bad that it was decided to empty the bowel by means of an artificial anus, a

Fig. 6

Blair, Virginia. Megacolon or Hirschsprung's disease, with artificial anus. Picture taken 24 hours after rectal injection of barium.

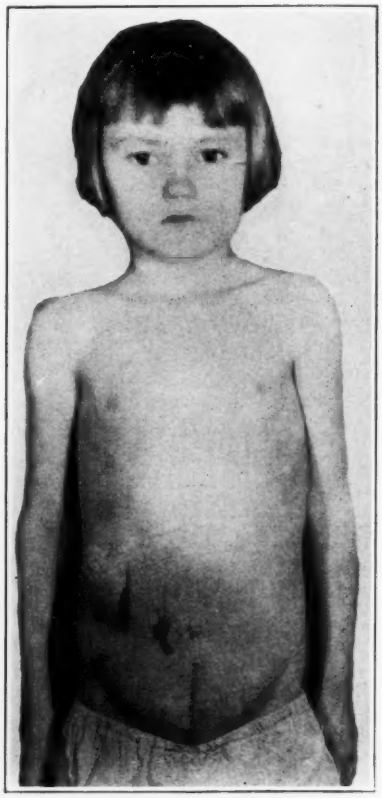

Fig. 7

Blair, Virginia. One and one-half years after operation on the presacral nerve and after spontaneous closure of artificial anus. Shows abdomen greatly reduced in size.

colostomy being performed in the usual manner. Upon opening the bowel more than a gallon of thin, very foul fecal material was passed with such force that the surgeon and nurses in the vicinity were covered. Within two or three days after the operation the toxicity seemed to disappear and the child's condition was greatly improved. At this time the bowels moved only through the artificial anus. About ten days after the operation it was decided to give a barium enema, which showed that the colon was markedly enlarged, though some of the barium rapidly passed out the artificial opening. The patient was sent home and returned three months later.

A roentgenogram made at the time of the second visit showed a large quantity of barium in the sigmoid and rectum, which demonstrated that there had been little if any movement from this part of the tract during the interval. A barium enema given at this time showed that the colon had diminished little if any in size.

Sacral anesthesia was administered. This was not successful in emptying the lower segment of the bowel. After waiting one or two days another barium enema was resorted to, followed by spinal anesthesia, and the sigmoid and rectum were emptied.

Operation February 18, 1932.—Under ether inhalation a median incision was made from the symphysis to the umbilicus. The transverse and descending colon were greatly enlarged and the walls very thick. The sigmoid and rectum were also greatly enlarged down to the pelvic floor.

The musculature of the sigmoid and rectum was less developed than in the transverse and descending colon. No peristaltic movements were seen in the colon under deep anesthesia, but were observed when the abdomen was first opened on handling the colon. The presacral nerve was a single trunk in this patient. The hypergastric nerve and the branches from the lumbar sympathetic chain were sectioned as far from the presacral nerve as was possible. The postoperative condition was good and the distention of the abdomen did not recur. The bowels began to act spontaneously and continued to do so until she was discharged from the hospital, there being one to four movements daily.

After this operation the artificial opening soon closed,

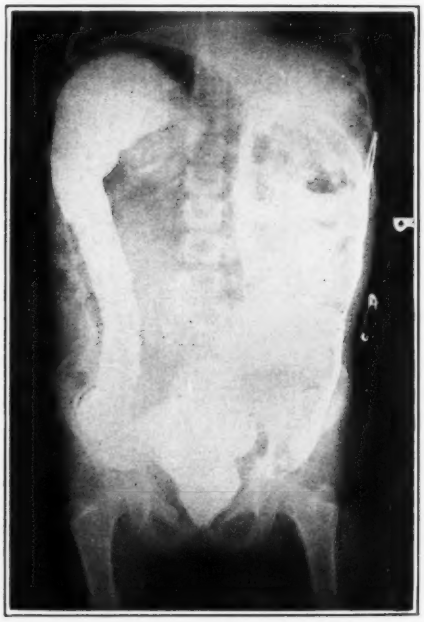

Fig. 8

Blair, Virginia. Approximately two years following admission. One and one-half years after operation, showing colon still distended with gas and enlarged, though bowel function is good.

though occasionally there would be a small discharge of fecal material through the artificial opening as a result of the accumulation of gas.

The last examination was made October 1, 1932, or one year following the initial attack. The child has gained very much in weight. The only treatment used during this interval was occasional small doses of mineral oil. A barium enema given at this time showed the colon to be smaller, especially the descending colon and sigmoid, than at the first and second examinations.

SUMMARY

Case 1 shows the result of section of the inferior mesentery and the presacral nerves. *Case 2* shows the section of only the presacral nerve.

In *Case 1* there was no change in the size of the colon as demonstrated by the roentgenogram, after nearly three years, though both the presacral and inferior mesenteric nerves were severed.

In *Case 2* there seems to be rather marked diminution in the size of the colon, although only the presacral nerve was sectioned.

Both of these cases have regained almost complete function.

Case 2 would seem to indicate that in some instances at least section of the presacral nerve alone is necessary if adequate peristaltic motion is present.

There was no interference with bladder function in either instance.

Desire to go to stool on the part of the first case was never present. No doubt proper training will eliminate this difficulty. In the other case, the desire having been present, was not interfered with.

Apparently section of presacral and inferior mesenteric nerves, if necessary, is the best form of treatment in Hirschsprung's disease and the operation is safe. Nerve section does not interfere with the other viscera.

Even though the size of the colon in some instances is apparently not reduced after three years, the individual seems to have good function. Time alone will tell whether there will be eventually a reduction in the size of the intestine.

In these two cases there is no evidence of effective regeneration of the sypmpathetic fibers.

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DISCUSSION (*Abstract*)

Dr. Stewart H. Welch, Birmingham, Ala.—In discussing the effect of sympathectomy upon Hirschsprung's disease it is necessary to divide the cases of megacolon into two groups: (1) the idiopathic, in which there are no demonstrable obstructive lesions, antemortem or postmortem. In this type of megacolon there is a break in the nervous mechanism of control of the rectum and colon. (2) There may be a secondary megacolon with demonstrable obstructions.

We have also to deal under the heading of Hirschsprung's disease with at least two types which are at variance with the above descriptions.

Brennenmann, of Chicago, writes of simple congenital anorectal strictures with megacolon in early infancy, and in these cases dilatation usually permanently relieves the condition and is followed by the disappearance of megacolon. He, however, cites this stricture as a possible cause of true megacolon.

Judd and Thompson have reviewed 65 cases of megacolon seen in the Mayo Clinic, 57 per cent of the idiopathic type. In the idiopathic group they include 5 with congenital deformity of the anal canal or lower portion of the rectum. These cases are included because the relief of the obstruction failed to relieve the megacolon. One characteristic of the idiopathic megacolon is the outstanding failure to relieve the megacolon after short circuiting or otherwise relieving the obstruction. The cases mentioned by Judd and Thompson were probably considered amenable to the procedures which relieve the idiopathic type.

The second exception is the so-called inflammatory type of megacolon, due to colitis usually in early infancy, in which the infection invades the walls and

causes degenerative changes in Auerbach's plexus, possibly in this way leading to a nervous imbalance.

In reviewing the literature, one is strikingly impressed with the unsatisfactory and undesirable results of surgery in this type of megacolon, nor can one help but be far less pleased with medical results. Roughly speaking, the mortality in medically cared for cases is from 67 to 74 per cent. In surgical cases there is around 30 per cent mortality and 40 per cent of cure, with the remaining 30 per cent of results unsatisfactory.

Hirschsprung's disease is brought about by a break in the normal nervous mechanism in which there is an exaggeration of inhibitions to the rectal longitudinal muscles, and at the same time an increase in the tone of the circular fibers, particularly in the sphincters, the most important of which is the anal sphincter. These fibers are largely supplied through the sympathetic nerves from the second, third and fourth lumbar ganglia. It is not known whether stimulation is preganglionic or postganglionic or central. But it is of diagnostic value that spinal anesthesia relieves the condition and stimulates defecation. The surgical procedures offered for relief depend on dividing the sympathetic branches to the rectum. This applies to ramisection, advised by Wade and Royle; bilateral ganglionectomy, advised by Judd and Adson; or a division of the inferior mesenteric and presacral nerves, as advised by Rankin and Learmonth. The Rankin and Learmonth operation was advised because it divides the sympathetic nerves after the vasomotor fibers to the extremities have been given off.

As shown in this paper, the use of sacral anesthesia permits the further modification of the Learmonth idea. Wade operates extraperitoneally. All other operations are transperitoneal, and they carry the risk of a major extraperitoneal or transperitoneal operation.

The results of this type of surgical procedure, in the few cases reported to date, show it to be the most valuable.

In looking over the status of the postoperative megacolon one cannot but be impressed with the fact: (1) that the colon shows very little tendency to return to normal; (2) that so large a reservoir for fecal and other colonic content is at least undesirable, and it would seem likely to be a detriment to health.

This gives to results of operations, however much can be said in their praise, the idea of incompleteness. It suggests the further study of the nervous mechanism of the colon for cause and relief. The basis for this reasoning is accentuated by the fact that secondary megacolons tend to return to normal with relief of their cause.

The authors of this paper are to be congratulated on wise and correct classification.

Dr. Hughes Kennedy, Jr., Birmingham, Ala.—It has been said that the development of surgery can be divided into four periods: heroic, anatomical, pathological and physiological. Surgery of any type is impossible without a full knowledge of anatomy and pathology. A satisfactory functional result cannot be obtained without a thorough comprehension of the physiology of the involved parts. And so it is with Hirschsprung's disease. When these cases were treated anatomically, the mortality was great and the functional result was not always satisfactory. As increased information was obtained in regard to the sympathetic control of the colon and the internal anal sphincter, physiological surgery was instituted. The results have been most gratifying.

In resecting only the inferior mesenteric and presacral nerves, instead of employing ramisectomy or ganglionectomy, the essayists have apparently chosen the best type of operation. Only the involved parts are affected, leaving the sympathetic fibers to the legs unharmed. The essayists are particularly to be commended in the second case where only the presacral nerve was resected. At operation it was planned to resect the inferior mesenteric plexus also. However, on opening the abdomen active peristalsis was seen and a fundamental knowledge of the sympathetic system dictated that only the presacral nerve be divided. Their judgment has been vindicated. If every surgical procedure were founded on sound physiology, the ultimate in results would be obtained.

Dr. Mitchell (closing).—While we do not feel that our observations of two cases are sufficient to prove that the condition known as Hirschsprung's disease has been conquered, considering that some 40 other cases have been reported cured by a similar method we do feel that this procedure offers more than any other tried up to the present time.

I believe that this type of operation would be classified as physiological surgery for the reason that, though we have definitely shown that the size of the colon varies but little even after two years, yet the function of the bowel appears virtually normal in both instances. I should further like to emphasize that this type of operation is much more applicable in true Hirschsprung's, or congenital dilatation of the bowel, where there is hypertrophy of the gut wall, than it is in the acquired case, where there is an atony of the intestinal wall. Time alone will tell whether the colon will become markedly reduced in size.

Dr. Semmes (closing).—As to whether lumbar ganglionectomy and resection of the sympathetic chains should be done rather than limiting the procedure to resection of the presacral nerve and the inferior mesenteric plexus, I think that as a matter of principal, interference should be limited as far as possible to the minimum that will accomplish the desired effect. Judging by the strikingly satisfactory results following resection of the presacral nerve and the inferior mesenteric plexus in one case and of the presacral nerve alone in the other, we are justified in sparing the vasomotor and sweat reflexes in the lower extremities and sparing the patient the added surgical trauma involved in removing the ganglia.

Of course, surgery of the sympathetic nervous system is still in the experimental stage and it is this that prompted us to report these two cases.

I should like to emphasize the importance of studying cases of Hirschsprung's disease, particularly in regard to the response to pharmacodynamic agents and to spinal anesthesia with the use of the fluoroscope.

THE ORGANIZATION OF RESEARCH IN CLINICAL AND PRECLINICAL DEPARTMENTS*

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The word organization has been specifically included in the title of this paper to emphasize its importance *for* research, but not *in* research. By this it is meant that all departmental affairs should be organized to assist the individual members in accomplishing their investigations, but that there should never be any effort to organize research itself. Of all basic principles concerning investigation perhaps the most essential is that research must be unrestricted from an intellectual viewpoint. Every investigator should be free to proceed along the natural channels of his own thought. Research which is trammelled by rules and regulations will inevitably fail in the production of those intangible results which are the essence of its value. Research may be thought of as a specific urge on the part of the worker to express some inner stimulus; when thus motivated it belongs among the creative arts. It may also be the result of any curiosity which remains unsatisfied until an answer is obtained; in this case it must be considered as purely scientific. Research which is done because it is an accepted part of the duties or routine of a given position will occasionally be successful; but the great mass of production under these conditions will not carry the mark of genius or materially advance science in its most serious aspects. In order to assure to any individual engaged in research the greatest promise of success, two major premises must be fulfilled. These are, that the individual enter the research field because of some inner urge and that he be assisted wherever necessary, but never bound by specific rules and hampering regulations.

It is my purpose today to discuss a few of the major principles which I think should be considered in the organization of departments to promote the possibilities of research. The major premises hold for both clinical and preclinical departments, and it is because I believe that the similarities in their problems are more important than their differences that I have specifically indicated both of them in the title.

The first of these major principles is time. It is true that certain rare individuals will force upon themselves the heavy burden of working at all and sundry hours and thus produce remarkable results, but almost invariably at the sacrifice of health and happiness. In departmental organization, therefore, too great a burden of routine duties, whether they be teaching, the care of patients or administrative obligations, will act as a marked deterrent to the development of research. One sees all too frequently the young instructor burdened with heavy teaching or many clinical duties, thus limiting his time for active research. As a rule, such an arrangement as this inevitably frees time for senior members of the department, which in my experience does not increase research production. I firmly believe in Professor Mall's dictum, that the most experienced members of a department should carry the major burden of the introductory courses, leaving the specialized electives for the younger members of the staff who are engaged in research in these particular fields. Often senior members of a department and in particular those carrying the administrative burdens are prone to delegate their teaching to the younger instructors, and then to use the time thus liberated for activities other than research. It is easy to drift into that most serious of all errors: the belief that organization and administration are matters of importance. They must inevitably be considered as a framework built solely for the purpose of making the development of teaching and research a simpler and more effective matter. Again Professor Mall's frequently reiterated opinion comes to my mind: that departments will run themselves with very little assistance, but that research demands the burning of midnight oil. Time, then, is an essential factor for research. We must recognize, of course, that no rule can be laid down for different departments in an individual institution, or analogous departments in different institutions. The amount of teaching, the number of clinical duties and other responsibilities cannot be estimated by any formula, but the administrative official should weigh very carefully the various duties which he assigns and adjust them to the research possibilities of the individual. Research does not thrive on a limited time diet. No fundamental investigations can possibly be expected to succeed unless adequate leisure is provided. The failure to provide time is usually explained on the basis of a limited number of instructors, many students, and long courses. I recognize these difficulties, but cannot refrain from pointing out that, in some institutions in

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which teaching has been considerably reduced in hours per instructor, the student output has definitely improved in quality. One may contrast the old-fashioned course in anatomy, covering two and perhaps three years, with many elaborate prosections, quizzes, and complete preliminary courses in special parts of the body with the more modern type of course extending over half the first year and involving a single but accurate dissection of the cadaver. I have heard the older system defended categorically on the basis that the student acquired more facts and could recite the origins and insertions of innumerable muscles. Such a defense is both academic and encyclopedic and reminds one of the principle involved in medical education of the Fourteenth Century, when memorizing medical treatises was the sole occupation of the medical student. Certainly such an approach is not calculated to strengthen the sinews of the mind and so equip a student for that independence which should be the basis for a medical career of the higher type.

Leisure can certainly be obtained for members of departmental staffs by the thoughtful analysis of the time devoted to teaching and the introduction of such changes in the curricula as will free instructors for a reasonable portion of the year. Experience has convinced me that this advice carries with it no hardship for the medical student; or perhaps I should say that at least there is no indication that his eventual development will be curtailed. In fact, while I believe his own reaction will at first be one of regret that he is not adequately protected from any mental effort, he will eventually appreciate the privilege of being permitted to work and think for himself.

Another suggestion for the saving of time for research should be the careful distribution of responsibility among the group teaching in any particular department. This obviously involves a careful balancing of the necessary teaching and other routine duties against the number of available instructors. It is, of course, highly desirable to have several instructors engaged in teaching any given course, but, on the other hand, it is certainly unnecessary in most of our medical schools to assign as much teaching to any one individual as is frequently done. A major course in anatomy for fifty students can be adequately handled by three instructors, and with reasonable success by two. As an illustration, if there are six instructors in the department, three should be assigned to anatomy and three to histology and neurology; it would seem to be foolish to make each of these groups overlap in order to have more than three instructors in each of the major courses. If four were the total number available instead of six, I should prefer to have two assigned to each course and maintain a separate schedule than to have all four engaged in both courses. Students should be, and I believe are, sufficiently developed when they enter medical school to preclude the necessity of more than a reasonable amount of instruction. This instruction should be the best possible in quality, but should not be so intense as to necessitate an extravagant burden on the part of the individual instructor.

The distribution of time between teaching and research in the organization of various departments are subjects which must be developed by careful thought in each individual case. The modern system of arranging free time in definite blocks in the preclinical group is an excellent means for allowing instructors a considerable and reasonable part of the academic year for developing their own problems. On the other hand, in the clinical departments, the allocation of duties is more difficult and free blocks of time are harder to obtain, since it is often necessary for staff members both to teach and maintain clinical obligations throughout the entire year. Furthermore, some general distribution of free time is often more useful, as many problems cannot be completed in short but massive periods. In summary, the question of distribution of time includes three major factors: (1) that the burden of preliminary teaching should become proportionately greater with the seniority of the teacher; (2) that the curriculum should be arranged always with the double viewpoint of giving the student adequate instruction, but not overburdening the instructor; and (3) that no instructor should be made to teach more than one major course, unless the number available is so limited that this is absolutely necessary to insure adequate teaching.

The second premise is intellectual encouragement as opposed to required research. It is well known that the development of research in university life has tended more and more to become a requirement for holding a teaching post. This has resulted in research becoming a matter of routine production rather than of an intense personal urge. Individuals should not be required to produce results in research in a given period of time, because some studies may come to successful termination in a month, while others may require a period of years. Selection of instructors and their promotion should not be determined by the number of papers they have published, but by the promise they give

of future development in the chosen subject. Such a method of organization is after all not organization, but the encouragement of natural bents.

Two other factors play important parts. I have seen promising research workers fail to develop adequately because, having unlimited materials, opportunities and encouragement, they became obsessed with the spirit of material things and confused apparatus with research. On the other hand, a tremendous amount of valuable encouragement and stimulus may result from the individual's feeling the necessity of overcoming difficulties which are placed, more or less accidentally, in his path. I do not believe that the young research worker should be overwhelmed with a sense of his own importance by being encouraged beyond the limits of his capacity. Nor do I believe that he should be permitted unlimited funds and assistance with which to learn habits of extravagance and waste. But encouragement is essential. The young worker who meets with enthusiasm, sympathy and understanding on the part of those who have already won their spurs in the field of research will be enormously encouraged to added effort and more careful work. His encouragement should not, however, be unmixed with adverse criticism. He should face the difficulties and complexities of research with open eyes, and no work except that of the finest character should receive commendation. This does not mean that he must invariably present successful results; often more encouragement and praise should be given for careful thought and intelligent planning than for accidental success. In this way the young worker develops good intellectual habits, and these habits result in the future production of better work. Publication should never be stressed as an essential fact, but should be the final result, to be thought of only when the work is complete. It should be considered not as the fruits of victory, but as the generosity of a satisfied worker. Once work is finished, it should be given to others for their use, not published as an advertisement for personal gain.

The first duty of any departmental director should be the training of young men to follow in his footsteps, and, if he is great enough, his students will go further than he has. Science is broader than departments, and a young and active mind may well cut its first teeth on morphological material but find its fullest development in the clinical fields. This is not waste, because science transcends all artificial divisions and seed planted in one department may often come to fruition in another. The most outstanding example that I can possibly quote is the tremendous effect upon the development of anatomy in the United States which was produced by the training Mall received in Ludwig's laboratory; Ludwig was not an anatomist but a physiologist. Teaching on the part of the senior members of a department must be recognized as a definite contribution to research in that they relieve the younger instructors of a major burden and thereby create a greater aggregate production measured both in the production of results and the training of men. Research must inevitably grow in a soil whose components are enthusiasm, opportunity and time, provided the selection of the seed for the planting has been wisely carried out.

Another major factor which must be considered is the relationship between individuals in the research organization in the department. I refer here particularly to technical assistance, technical specialization and the supplying of needed materials. I have seen laboratories in which even the most advanced workers had little or no technical assistance and were compelled to carry out all routine activities regardless of how simple they might be. I have seen other laboratories in which the technical assistants were much too numerous and specialized. Both conditions are wrong. Research students and younger instructors should be given only the minimal assistance needed to carry out their experiments, and no student or instructor should ever be given specialized technical assistance until he has himself completely mastered the details of the methods involved. A good example of this lies in research of a morphological character. Many laboratories specializing in morphological methods have technicians whose duties are specifically the cutting and staining of tissues, and it is only natural that a busy and enthusiastic instructor should feel that such assistance would materially aid him in completing more experiments. It should be borne in mind that discipline in technic is discipline in development. It is splendid to relieve staff members of the burden of work which can be done by technical assistants. But it should never be forgotten that such assistance may do incalculable harm and produce a mental attitude in the student that can wreck his eventual career. Once he is master of the technic involved and is completely at home with the necessary apparatus, then such assistance as he absolutely needs should be provided if possible; but just as it is unwise to give him assistance before he is capable of appreciating it, equally it is unwise

not to give him reasonable assistance when he is prepared to use it wisely. It is obvious that adequate technical assistance without waste should be available. But the desire to increase production, either on the part of the individual or the departmental director, should never be a matter of primary importance in comparison with the psychological health of the young investigator. All of these statements can be repeated for the physical equipment necessary for research. Beautiful apparatus, elaborate individual supplies and extensive space are undoubtedly charming surroundings for the research worker, but it has never been adequately demonstrated that apparatus or material should be more elaborate than the needs of the work justify. For example, one might suggest that a balance, for weighing materials in which one gram is the maximum accuracy demanded by a problem, need not be of such a character that one-hundredth of a milligram can be determined, nor is it necessary that laboratory rooms be paneled in mahogany or rugs supplied for the feet of weary workers. The expenditure of money must be justified. Money available for the advancement of science is a profound and serious trust to be approached not with lightness and unconcern, but as a doctor approaches his patient, a responsibility to be treated with the utmost consideration. Because there are adequate funds and equipment in the laboratory there is no need for waste. Scientific production depends upon reasonable comfort, reasonable assistance, reasonable material support, and enthusiastic work.

Another of the fundamental principles which must be visualized as a major premise is the relationship of problem to subject and subject to problem. Our medical schools are so organized that teaching is arranged in separate groups or departments; as a last analysis these are based primarily upon technic rather than upon subject matter. Or perhaps it can be stated in another way; the subject matter of medical education is the human body and each department studies it in a different way; the selection being based largely on technical methods. If one may grossly exaggerate for illustration, in the study of the human body, the anatomist uses microtome and microscope, the physiologist kymograph and induction coil, the biochemist test tube and balance. Such an organization is perfectly sound and reasonable and is based upon the fact that the amount of material available is so great that specialization and subdivision must be utilized for accuracy of results. But it leads us to a further thought; that research must and should transcend departments and should call to the solving of any problem every tool and method which can be used to advantage. From the standpoint of the organization, let us suppose that an instructor teaching anatomy is working on a problem in which the use of physiological or biochemical methods would advance his study. He should form some association with members of these departments for assistance or be sent to them for guidance. If his interests in the newer phase is greater than his interest in the work previously done, he should transfer to the field of work where his major interest lies.

The last major premise which I wish to discuss is the inclusion in departments of extraneous individuals specifically hired to do research but having a technical training different from the department in which he works. I am firmly convinced that this approach is in general both unwise and unfair. It is unwise because research should be the essential expression of the individual's primary interest and not simply work done for hire. It is unfair because in many instances a young individual well trained in a specific branch is lured by financial advantage to work in some other department and hence loses his opportunity for becoming known within the group where his own future advantage must chiefly reside. No hard and fast rule should be laid down in this regard, but the psychological effects on the individual and his eventual career should always be borne in mind before any appointments of such a character are made. The individual concerned should be fully cognizant of all implications of this character and should face without question his own danger in the future. With these points in mind, there are at times circumstances which justify such appointments. These, however, should be rare, and the individual needing assistance of a type distinct from his own departmental association should seek it from confreres in other departments whose interest and assistance may, it is my optimistic belief and personal experience, always be enlisted.

In discussing the major premises outlined above, I have considered primarily those activities which equally involve both preclinical and clinical groups. I should like to comment briefly on certain factors which are of especial importance to the clinical departments. I am assuming in the first place that by clinical departments is meant full-time departments or departments in which at least a portion of the staff is without the necessity of earning its living by private practice. Members of clinical depart-

ments must teach, and research looms with almost equal importance in their careers. But in addition much time must be given to the care of patients. This additional load must be compensated for by proportionately increasing the size of the clinical department.

Any consideration of the question of encouraging research on the part of hospital house officers and junior members of clinical departments must be approached after viewing medical training as a whole. I visualize the medical career as starting with the first day of the first year of the medical student's life. I do not believe that one should look upon the time of graduation as a very sharp and specific separation or as the beginning of a new career. A medical student should pass imperceptibly from the end of his fourth year to an internship and in like manner to further advancement in full-time medicine. It is perfectly obvious, I think, that when a man completes his hospital training and goes out into private practice he cannot be expected to maintain a research career. This does not mean that he must lose interest in research, but that a busy and successful practice does not permit of adequate leisure for successful research. Our discussion is therefore limited to those men who continue in full-time medicine or who are closely associated with a teaching institution and are able therefore to devote a reasonable amount of time to research. I believe that research training is splendid, even for those who become general practitioners and only engage in active investigation during the time they are on hospital staffs. On the other hand, I should prefer to see every student, house officer, or instructor in a clinical department act precisely as if he expected to continue in full-time medicine for his entire life. Should he decide in favor of practice, the training which he receives will fit him better for the multifarious problems which he must meet in his daily work, and if he remains in full-time medicine, he will have saved much time by starting early in his research development. This does not mean, as I have pointed out elsewhere, that every medical student should be encouraged to do research, but that all of those with interest and aptitude should be given the opportunity and from this group, if they are otherwise acceptable as interns, one may select the individuals to whom greatest liberty and opportunity can be given. There are so many things to be considered that one can only make suggestions, but I wish specifically to emphasize that research be made an opportunity rather than a requirement. Certain individuals can be given more time for research than others and allowed to develop along the line of their principal bent. Here very careful organization is necessary in order to create the free time for part or all such individual workers. In general I oppose the block system of free time for house officers, unless it is possible to make it so flexible that during the time devoted to other duties some time be available for research; and conversely that, should the individual prefer clinical duties to research, such opportunities may be substituted. As in preclinical work, I am firmly convinced that the preliminary and basic courses in medicine, surgery and the specialties should be given by the senior members of departmental staffs, and that advanced courses should be delegated to the younger individuals who are specializing in these fields. The duties of the senior members in clinical departments will inevitably be professional to a greater degree than junior members, regardless of whether they are on a full-time basis or not. But it is always to be remembered that such duties can be reduced in quantity by the expedient mentioned above, that is, of increasing the size of the staff. Much feeling has developed at times in preclinical departments in their desire to have parity of staff members with the clinical departments. This I believe to be wholly unjustified. Their teaching may be in some instances equal to or even greater in clock hours than the teaching in clinical departments, but I do not believe that any other single individual duty in a medical school can be equivalent to the necessities which are part of the hospitalization and care of patients.

I am wholly conscious that the pressure of clinical work upon the young medical graduate is such that the patient occupies a major portion of his interest. This is indeed as it should be, and no one would feel more regret than I at the thought of patients' being neglected for research. But medical education and the development of medicine are based upon the research principle, and consequently we cannot possibly avoid the consistent fact that research must be considered a most important and essential part of the program of a full-time clinical department. Again we meet with the same factors: time, encouragement and organized relationships; and again we must recognize that every individual department can solve these by no single yardstick or rule of thumb. Encouragement can only be given by the enthusiastic teacher. Intimate contact between junior and senior members is much to be desired. One seemingly important part of the life of hospitals which I have always personally deplored is the

pomp and circumstance of rank. A more human and intimate association between seniors and juniors would, I feel, bring a deeper stimulation than is at present obtained.

One always questions the boundaries or limits for research in any department. Should a young instructor in medicine, for example, feel that his selected problem must be some specifically circumscribed phase of internal medicine, or should he be allowed to choose a problem in pathology, physiology, biochemistry or morphology? I do not feel that research has any limitations, but I do feel that there are certain customs which should be borne in mind. If the primary interest is in a purely morphological field, the individual should transfer to the department of anatomy. In other words, research should not be assigned, but research interests should be permitted to guide the individual's activity. Where clinical work and a clinical career are the primary interests, his problem should fit to some extent with the basic principles of the department in which he works. These may involve physiological and morphological methods, but should always have in the forefront of the picture a definite clinical application. I do not agree with those individuals who maintain that research in clinical departments should be of other than clinical character, nor do I agree with those who maintain that all morphological and functional work is best done by those individuals who have had no opportunity to approach the bedside of a patient. In other words, research for members of the clinical departments should be research which has in mind the primary problems of disease, and should be secondary in any adaptation in which may be involved those methods especially used in the morphological or functional branches. In many ways research in the clinical departments can best be carried out in large groups associated with members of one or more preclinical divisions, involving an adequate knowledge on the part of the clinician of the object to be desired as a successful completion of the problem, and, on the part of the preclinical associates, of the methods of investigation best calculated to yield the desired results.

In conclusion, I wish to stress certain points. In the first place, organization of research really means organization of everything else that a man may be expected to do in such a manner that he has adequate time and freedom to be used for research if his inclination prompts him in that direction. Under no circumstances should research be required. Research should be the result of an internal urge. When research can only be produced by pressure from the heads of departments, directors of institutions, or others in authority, or must be persuaded from individuals by the offer of rewards in money or promotion, it will be worthless. It is obvious that no young man can be expected to do research in time when he is compelled by necessity to be engaged in other activities. He must have assistance, encouragement and direction in order to accomplish anything worthwhile, but he must not be smothered by overindulgence or too much freedom, because by such means do we induce an atrophy of all interest and enthusiasm. In the choice of problem and of department, individuals must be swayed by interest and opportunity and must change as these are modified. Pressure must be made upon outside influences to hold back their deleterious effects, but unless the internal urge or that urge which may be awakened by the influence of a stimulating mind be present, the results will be spurious and worthless. Individuals without the inner lamp of research desire should not be forced or enticed into work, but urged to go elsewhere and find for themselves places in which success is not dependent upon that peculiar condition: the urge to investigate.

DISCUSSION (*Abstract*)

Dr. W. S. Leathers, Nashville, Tenn.—Dr. Cunningham's reference to the maintenance of the "psychological health" of the investigator is a unique conception. It is of importance to give every encouragement to members of the teaching staff of the medical school engaged in investigative work. The idea expressed emphasizes the importance of giving encouragement and affording conditions which will provide as far as possible an undisturbed attitude of one who may be not only engaged in teaching, but in addition is giving much time to research. In many institutions the time afforded for investigative work is quite limited and oftentimes teachers are overburdened in an attempt to carry on a heavy program of instruction and also investigative work. Ideally a certain amount of time should be allowed for research for those who are competent to engage in this activity of a medical school, and in every way possible facilities should be provided which will encourage those who are ambitious along this line. From an administrative standpoint it is important to maintain a sympathetic attitude in this respect, otherwise the academic atmosphere of the medical school becomes quite circumbscribed.

TREATMENT OF INTRACTABLE LARYNGEAL PAPILLOMA IN ADULTS, WITH CASE REPORT*

By LEE COHEN, M.D.,
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According to Jackson, of all benign growths in the larynx papilloma is the most frequent. It may occur at any period of life from infancy to old age, and may even be congenital. He reports one case of an infant two months old which died of suffocation after he had been summoned, but before he could reach its side; also another, an infant at birth, which he saved by the prompt removal of papillomata through the direct speculum.

The marked tendency to recurrence of papilloma in young children, despite all treatment, is too well known to require more than passing mention. The lessening of this tendency to recur as the child grows older, and the fact that after puberty many cases which had resisted all manner of treatment undergo spontaneous involution, has led to the assumption that papilloma in children is a self-limited disease.

Be this as it may, the fact remains that in adults papilloma shows but a comparatively slight tendency persistently to repullulate, and is much more amenable to treatment. Most cases in adults fail to recur after a single surgical extirpation, without other treatment, yet now and then we are confronted with an adult case in which, after repeated removal, the return is a matter of but a short time. Although, because of the larger size of the adult larynx, danger to life through impaired breathing is very rarely a disturbing factor, the economic loss through voice impairment may be a serious matter and is always most depressing to the patient.

Besides, the possibility that every uncured papilloma in adults may become malignant, must ever be borne in mind. Urologists believe that at least 50 per cent of bladder papillomata are either malignant or become so, and it is no exaggeration to state that any recurrent laryngeal papilloma in adults may be considered potentially malignant, since many of them do become cancerous. We have seen several such cases. One of these recurred repeatedly over a period of seven years before the microscope revealed malignancy. It will be referred to in detail later. These intractable cases tax to the utmost the patience of the sufferer, as well as the ingenuity of the laryngologist, and methods for their permanent cure merit our most painstaking and unbiased consideration. Complete rest of the voice, as in all pathological changes within the larynx, must of course be strictly enjoined.

While tracheotomy, because of impending danger from suffocation, or because of the beneficial effects of rest induced by long breathing through the tracheotomic cannula, occupies an important place in the management of laryngeal papilloma in children, it is seldom, if ever, required in adults.

Surgical extirpation of the growth is universally recognized as the first step in the cure of laryngeal papilloma in adults, no matter what procedure may later be employed to prevent its recurrence. Although thyrotomy and laryngofissure have been employed, the endoscopic method of removal is now conceded by laryngologists the world over to be the only method worthy of consideration. Some few still make use of the indirect method, cutting forceps directed by the laryngeal mirror, and there is no doubt that some single or circumscribed growths may be satisfactorily removed in this way. By and large, however, the direct method through the tubular speculum of Jackson, Mosher or Bruening is the most widely employed.

The precision with which single and circumscribed growths within the larynx may be removed, under local anesthesia, with cutting forceps through the tubular speculum, makes it a most desirable method. When, however, we have to deal with extensive papillomatosis, in which multiple tumor masses grow from every conceivable part of the larynx, above, on and below the cords, to attempt their removal under local anesthesia in one sitting, through the tubular specular, is not only a severe ordeal for the patient, but a most difficult task for the surgeon. The prolonged strain on the left hand holding the speculum makes for unsteadiness and lack of precision in the use of the cutting forceps held in the right hand, and damage to the normal tissues is more likely. Two or more sittings to complete the work are, therefore, a frequent necessity, and even then we are never sure that the entire growth has been removed.

In such cases, with the patient under ether, it is possible by suspension laryngoscopy, using either the Killian apparatus or Lynch's modifi-

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cation thereof, to sit comfortably at the head of the patient and to operate with the same ease enjoyed by the gynecologist when operating upon the uterus through the vagina. In addition, the larger instrumental approach afforded by the wide open mouth, and the type of spatulae used in the suspension apparatus, makes for such great ease in orientation that thorough extirpation can be accomplished in a short time, without fatigue to the operator or strain on the patient. Also, the left hand, being entirely free, may be used to retract one cord, while the right hand, with cutting forceps, removes tumor tissue from the subglottic space and from the other cord, or with the suction tube may keep the field clear from blood and secretion.

The lamented Lynch, whose ingenuity did so much to perfect suspension laryngoscopy, time and again emphasized these advantages. The German laryngologists, since introduction of the method by Killian in 1911, have been making more and more use of suspension, yet comparatively few of our American colleagues have adopted it. For the past twenty years it has been our routine procedure in all difficult cases, and I commend it most highly to the consideration of those operators who have not already taken advantage of this safe and precise method.

It matters not by what method we extirpate the growth, it should be our endeavor to remove the last vestige of papilloma with the least possible damage to the underlying normal tissues. Otherwise, early recurrence is invited, or permanent impairment of the voice may result from injury done the arytenoid cartilages or vocal cords.

After the surgical removal of papilloma, to prevent recurrence, various chemical substances have been applied to the surface. Jackson uses pure alcohol and recommends it above all things. Runge and other continental men cauterize the surface with fuming nitric acid, and still others have made use of trichloracetic and lactic acid. Of all these substances alcohol would seem the safest, as deep destruction of the underlying tissues possible from the more caustic reagents does not follow its use.

Actual cautery has also been employed, but because of the possibility of its use being followed by cicatricial stenosis, it does not seem to be a safe measure. Harmon Smith and Hubbard report good results from fulguration, in the prevention of recurrence, but other observers have met with much less encouraging results, and to some its use has been entirely disappointing.

Irradiation from radium and roentgen ray has been used by some in America, but more extensively by European observers, in the prevention of recurrence, and very many excellent results are recorded. The serious results, however, which have followed its use in the causation of perichondritis, ending at times in complete destruction of the laryngeal cartilages, and in some instances in death of the patient, have naturally prejudiced some of our most eminent colleagues against its use. Even Jackson and Clerf have expressed such opposition as to make many of us who have high regard for their judgment reluctant to try it, while Iglauer's review of the literature in 1927, disclosing 20 recorded cases of severe and irreparable injury to the larynx following roentgen ray treatment, created such widespread dread of this measure that one trembled at the thought of subjecting a patient to it.

When, however, we study the good results, without any untoward reaction, reported by Hickey, New and myself from the use of radium, and by Soloman and Blondeau, Spira, Gray, Dahman, Blau and Thrane from the use of roentgen ray, without damage to the cartilage, one is forced to the conclusion that, with the present better understanding in the gauging of dosage with proper filtration, such disasters need not longer occur; that we are entirely justified in making use of this agency in those intractable adult cases which have repeatedly suffered recurrence, in spite of all other measures employed. Further evidence of the safety of irradiation in the proper hands was received a week ago in a personal letter from Dr. Curtis Burnam. He reported that in the Kelly Sanitarium, during the past 19 years, 204 cases were irradiated with radium and roentgen ray for the cure of all types of laryngeal growths; that damage to the cartilages resulted in only two cases, and this occurred in the early days of its use, before the dosage and proper filtration methods were well understood.

To attempt cure by the use of irradiation, without first removing the growth surgically, as has been done by some, would seem a serious mistake. Papilloma itself is highly resistant to irradiation, whereas the laryngeal cartilages have a very low resistance against it; consequently the massive doses required for the destruction of the papilloma would of a certainty end in disaster to the cartilages. On the other hand, after

the surgical removal of the growth, mild doses, which do not harm the cartilages, seem sufficient so to affect the underlying normal tissue as to make recurrence less likely, and in many instances prevent it entirely.

Experience has shown that radium and roentgen rays are quite as effectual when applied from the outside of the neck, over each side of the larynx; and in light doses, with the proper screening, they will not be followed by untoward results to the cartilages. Hence application from without must be looked upon as the method of choice. It is, however, of the utmost importance that the size of the portal of entry of the rays through the skin should be accurately adjusted in order to take in the larynx only.

It is, furthermore, my strong conviction that these most potent agencies should not be utilized by the laryngologist himself, or their application entrusted to the regular x-ray man who devotes his attention mainly to the making of diagnostic plates, because neither of them can be expected to have the well grounded knowledge necessary for their safe use. Only an experienced radiologist, well versed in the physiological effects and the dangers from its faulty use, should be entrusted with this delicate task. In our city I know of only one institution to which I would entrust my patients, and there I feel confident that the best results will be obtained, with little or no likelihood of serious complications. The problem for the laryngologist in the smaller town is in not having such an institution close at hand. For him the only safe procedure, after removing the growth surgically himself, is to send his patient to the trained man to be found in the larger medical centers.

Two cases have been selected from my records to report in detail. The first illustrates the destructive effects of irradiation from massive doses of radium placed inside of the larynx; the second will show the excellent results from irradiation following the proper dosage of roentgen rays used from the outside, over the larynx, in a case where recurrence seemed endless.

Case 1.—A man, 42 years old, was first seen by us in 1923. During four years prior to this he had been twice operated upon for multiple papillomata of the larynx, with improvement of the voice lasting four or five months. He had also received 5 radium treatments, application having been made from the side of the neck, over the larynx, at intervals of about one month.

When first seen by us he could speak only in a whisper, and on the least exertion he suffered greatly from dyspnea. Two days later, under suspension laryngoscopy, the larynx, which was practically filled with papillomata, was cleared with cutting forceps and alcohol applied to the surface. The microscope showed typical papillomata. Following operation, radium was applied from the outside 8 times, at intervals of four weeks.

In spite of this, one year later, with the return of papillomata, hoarseness recurred. Again, under suspension, the growths were removed and once more proved, under microscopic examination, to be simple papillomata. Radium treatment followed as before.

One year later there was recurrence. Radium at this time was applied through the Haslinger directoscope direct to the growths within the larynx. For six months all went well, then there was recurrence. It was now determined that the growth, which had undergone changes, was squamous cell epithelioma.

The patient was informed that we now had a cancer to deal with, and that unless he submitted to total laryngectomy or to the application of radium direct to the growth through a thyrotomy wound, a fatal outcome only could be expected. It was thought that by this latter method we might get rid of the cancer and retain his larynx so that he could breathe through the natural passages and still be able to whisper. One month later this was done in the hospital under local anesthesia. A 500 mc. radium capsule was allowed to remain in the larynx five hours.

Perichondritis ensued, involving all cartilages of the larynx except the epiglottis. Three months later all cartilages had melted away, leaving a large fistula leading into the throat. This fistula was subsequently reduced by a plastic operation to one-half its size, half of the flap sloughing away, owing to the effect of radium on tissue healing.

The patient was supplied with an artificial larynx, which he learned to use, and he was thus able to continue with his work as city salesman. He improved greatly in general health, his body weight increasing 40 pounds in a few months. Aside from the small fistula remaining in the neck, he was in no way worse off than he would have been had a total laryngectomy been done.

Case 2.—A man, age 30 years, consulted us October 30, 1930, complaining of hoarseness for the previous six years, which had so interfered with his duties that he could no longer retain his post as manager of a large insurance company's branch office.

During his school and college years he had been very active in athletics and, having had vocal training, he used his voice continually in glee clubs and choirs. In 1917, while in a football game, he received a violent injury to his larynx, rupturing a blood vessel and causing expectoration of bloody mucus for several weeks. Also there was a constant inclination to clear the throat and he could not at that time speak above a whisper. After some weeks of treatment his voice returned to normal.

In 1921, while blocking a field kick, he again sustained a severe injury to the larynx, resulting in complete loss of the voice for about two weeks. After this period he had no further trouble with his voice until 1924, when he experienced great difficulty while singing in reaching high notes, though the speaking voice seemed to meet all demands.

On March 4, 1924, on leaving the train after a trip

from Chicago to his home in Washington, he suddenly found he could speak only in a gruff whisper and with the greatest effort. He was referred by his family physician, whom he immediately consulted, to a leading laryngologist, who diagnosed laryngeal papillomata and operated upon him for their removal. After a period of several weeks' rest in the country, he returned for further treatment, but his voice showed no improvement.

In July, 1924, he was sent for examination to a noted laryngologist in a neighboring city. After a complete physical check-up, which proved negative, he was advised to return home and continue treatments inaugurated there. This he did, expressing also willingness to submit to any operation which might improve his voice. He was, thereupon, again sent to the hospital and operated upon a second time for removal of the growths. After the usual several weeks of vocal rest, his voice as bad as ever, he was told to return for further consultation to the neighboring city. Here, at the hands of the laryngologist who had previously seen him, he was operated upon through the tubular speculum, under local anesthesia, for removal of papillomata. In the words of the patient, "Owing to the uncomfortable position of the head, it was repeatedly necessary to interrupt the operation by periods of rest." In spite of such interruptions, the prolonged work through the speculum taxed his endurance to the utmost limit, and he felt that he could never again undergo such an operation.

After subjecting himself to all this, however, his voice showed no improvement whatever. On returning to his home laryngologist he was told that all measures known had been employed and that there was no hope for him of anything other than a life-long whispering voice. From this time on until we saw him he underwent a period of great mental depression. In his despair he even resorted to chiropractors and osteopaths.

On first examination we found a markedly impaired nasal breathing, due to septal deflection and hypertrophied turbinates, which until now had received no attention. His faucial tonsils had been removed, but a lingual tonsil of unusual size existed. The larynx was almost filled with multiple papillomata, growing from both cords, in the anterior commissure, and some could be seen in the subglottic space.

It was felt that elimination of the condition in the nose and the lingual tonsil was necessary before we could hope for a lasting result in the larynx. On October 30, 1930, a submucous resection, double lower turbinate compression and removal of the posterior pendulous ends of both lower turbinates were accomplished. Also the lingual tonsil was subsequently removed.

Three weeks later, November 21, under ether, he was placed upon the suspension apparatus, all papillomata in the larynx were removed and alcohol was freely applied to the raw surfaces. At this time I must again aver that it would to me have been an impossibility to have removed through the tubular speculum, under local anesthesia, the papillomatous tissue situated in the anterior commissure and below the cords in the subglottic space. Eighteen days later, during which complete vocal rest was required, he was able to speak with a voice of almost normal tone.

To insure against recurrence of the growths it was decided to use the roentgen ray. Dr. Curtis Burnam, of the Kelly Sanitarium staff, advised that one-half erythema dose be applied to each side of the larynx from the outside, so that the growth itself would receive a full erythema dose, that is, about 1,000 radio units, three days preliminary to operation. He believes that through this preliminary dose reimplantation of the growth is less likely to follow injury to the tissues, and that the subsequent operation will be more successful.

On December 23, 1930, five days following the operation, one-fourth erythema dose of roentgen ray was given from each side, and the same dose was given January 5, January 11, February 15, and March 11, 1931. All these treatments were given at a distance of 52 cm., with a 250 kilovolt apparatus, and with a filtration of 1 mm. of copper and 1 mm. of aluminum. You will note the small dosage used in each treatment and the care exercised in screening in order to obviate damage to the cartilages.

Up to the present time, over two years after operation, there has been no recurrence of growths, the speaking voice has been normal, and the patient has regained his old position with the insurance company.

The result in this case strongly emphasizes:

(1) That, through the suspension apparatus, complete removal of the papillomata, which had three times recurred after operation through the tubular speculum, was accomplished.

(2) That mild irradiation of roentgen ray, from the outside of the larynx, may in the proper hands be used without damage to the laryngeal cartilages.

(3) Following this irradiation there has been no recurrence of the papillomata for over two years, which we believe is sufficient time for the case to be considered a permanent cure.

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Discussion follows paper of Dr. John H. Foster, page 628.

PAPILLOMATOSIS LARYNGIS*

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By the term *papillomatosis laryngis* is meant a condition appearing in early childhood, sometimes congenital, characterized by the occurrence of multiple papillomata on the mucous membrane of the larynx and adjacent parts, which growths have a marked tendency to recur after removal and to be transplanted to neighboring parts. It is a locally malignant condition in contradistinction to papillomata occurring particularly in adults, which do not exhibit this tendency to recur to a great degree.

Nothing is known as to the cause of this condition. Formerly lues was suspected as a causative factor, but in a comprehensive review of the literature of the subject I have found only one case where syphilis was positively diagnosed and the condition cleared up under antiluetic treatment. In none of my cases has there been any evidence of lues.

Papillomatosis has been characterized as a self-limited disease, since the tendency to recurrence lessens after the establishment of puberty and some cases spontaneously clear up. Here again is apparent the analogy to nasopharyngeal fibromata. Jackson states:

"Multiple recurrent papillomata of children constitute a self-limited disease usually ending in recovery if asphyxia is prevented by a timely tracheotomy."

However, a large per cent of cases do not exhibit this tendency to a marked degree. This fact will be referred to later in discussing tracheotomy as a therapeutic measure.

If untreated, the condition usually progresses to suffocation by the extent of the growth or from fibrous laryngeal stenosis. What the physiological change is producing this tendency to spontaneous recovery is not known. Schroetter is quoted as offering the explanation that the location and motility of the growths result in injury to their blood supply which favors absorption and disappearance.

TREATMENT

It is impracticable as well as needless in this article to refer specifically to all the papers written on the treatment of this condition. Much would be repetition. Excellent reviews of the literature have been published by Harmon Smith, New, Crowe and Breitstein and others; and these will be drawn on freely in discussing the results of the various therapeutic methods used in this disease.

Forms of treatment that have been tried extensively and, at times, lauded highly include:

(1) Medical treatment
(2) Tracheotomy
(3) Laryngo-fissure
(4) Endolaryngeal operations
(5) Fulguration and diathermy
(6) Radium
(7) Roentgen therapy

(1) *Medical Treatment.*—Delavan and others reported good results from the local application of absolute alcohol to the affected parts. Shurley recommended at one time *Thuja occidentalis* locally and internally. Lynch stated that he obtained better results from the local application of acid nitrate of mercury than from operative means. Formaldehyde, castor oil, and various astringents have had their advocates. At present most of these applications have fallen into disuse, but during 1929 two authors, Dahmann and Runge, recommended the use of nitric acid and have devised special applicators for the use of this drug. S. A. Lurie reports the successful treatment of verrucae vulgares (Palmar and Plantar) by intramuscular injection of bismuth salicylate. So far as I know, this has not been tried in laryngeal papillomata, but it might merit a trial.

B. Katz reviewed the use of calcined magnesia by others and reported favorably on its employment in three cases in his own practice. He combined operative treatment with the administration of magnesia.

(2) *Tracheotomy.*—That a low tracheotomy, carefully done under local anesthesia, should be performed in every case as a preliminary to any other form of treatment is generally accepted, although numerous operators, including R. McKinney, reserve tracheotomy until it is demanded to avoid asphyxia. G. Hunter MacKenzie many years ago recommended tracheotomy as the best therapeutic measure. He re-

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ported the cure of cases after wearing a tube from six months to two years. Others since that time have given evidence as to the efficacy of this procedure, but that this view is not unanimously accepted may be seen by those quoted by Crowe.

(3) Laryngo-fissure as an approach for operative measures may well be mentioned only to be condemned, but it has had extensive use in the past. Instances are recorded where this operation has been repeated fifteen times or more. One may picture the condition of such a larynx.

(4) *Endolaryngeal Operations.*—With the improvement of methods following the introduction of the direct laryngoscope and later the suspension laryngoscope the occasion for thyrotomy disappeared and a number of writers reported ideal results following careful operative removal of the growths. McKinney, Lynch, Dan McKenzie and Albrecht stated that they had excellent results from operations under suspension laryngoscopy. Lynch, however, as quoted above, seems later to have abandoned this method. Jackson says:

"The best method of cure of multiple laryngeal papillomata is to scalp off the projecting parts of the growths without any attempt at removal of the base, repeating the procedure as often as repullulating buds appear."

Tucker recites cases treated by this method with satisfactory results in from a few months to two years. Crowe, in speaking of endolaryngeal removal, says:

"The experience of the majority of French, German, Austrian, English, Italian, and American writers is that when the growths are removed endolaryngeally with any kind of curette or forceps they almost invariably recur and the operation must be repeated throughout months and years."

While the appearance of the larynx in these cases presents such a temptation to the laryngeal surgeon that it is difficult to stay his hand, the observation of the distortion, atresia and permanent loss of good voice following attempts at thorough removal should warn one against such endeavor.

(5) Fulguration alone, or combined with operative measures or diathermy, has been extensively used. The results of its use in papilloma of the skin and the bladder were so satisfactory that it was hoped that equally good results could be obtained in the larynx, but the reports indicate considerable disappointment. Harmon Smith says that fulguration is better than operative removal, but has been disappointing as a permanent and positive relief. Crowe says fulguration and radium is the best method in adults, but disappointing in children. Lynch used fulguration to a considerable extent and found it better than operative measures. Hubbard and Galbraith advocate the use of fulguration and diathermy.

(6) *Radium.*—It was inevitable that the results reported from the use of radium in other neoplasms should lead to the use of it in the one under discussion; and likewise as inevitable that the results should be as diverse as in other conditions. Some observers reported excellent results, while others, as Tucker, saw cases where the growth was stimulated and others where extensive necrosis of the cartilage ensued with consequent collapse of the larynx. The further and more extensive use of radium at the Johns Hopkins and Mayo Clinics seemed to indicate that in this we had the most useful means at our command in clearing up papillomatosis. The results depended on care in the method of use and in the length of exposure. The best, and most complete, report I have encountered was published by New in 1921. In this he concludes:

"During the past six years I have used radium inside the larynx and outside the neck and the results have been much more satisfactory than with any previous method."

Of 17 cases treated and traced, 11 were free from papillomata. Nine of these had had tracheotomies and the tubes were removed. Two cases were treated by means of radium on the outside alone. The 6 recurring cases were still under treatment and improved.

X-Rays.—Roentgen therapy for papilloma of the larynx has been resorted to sporadically for many years to judge from the literature. John Dunn, in 1909, reported a child two years of age treated with the x-ray with perfect result, and another case which improved, but was lost sight of. Gray gave the technic employed in the cases reported by Dr. Dunn.

Case 1. He used ½ to ¾ milliamperes; 4/5 inch spark gap; 10 inches from the skin; 10 minute exposure daily on alternate sides of the neck. Thirteen exposures were given in the first course. A year later, 9 treatments were given and six months later 11 treatments in nineteen days.

Case 2.—Three-fourths milliamperes; exposure 5 minutes at 15 inch distance; 8 treatments given in eight days and improvement was noted after five treatments.

Solomon and Blondeau report 3 cases treated with x-ray with good results. The first case was a young man whose larynx was filled with papillomata and who was wearing a tracheal cannula. He was treated with doses of 1000 roentgen units applied twice a week to alternate sides of the neck. After the third exposure the tracheal cannula was removed. After

the seventh, and last, exposure the voice became normal. Seen eight months later the larynx was normal in appearance and the patient could talk and sing well. Good results were reported in the 2 other cases which had 8000 roentgen units applied in the course of twelve weeks. Gruschetzkaja in 1927 reported 7 cases with good results from the use of the x-rays. Spira in 1928 reported four recurring cases relieved by this form of treatment.

There seems to have been considerable variation in the technic employed. References are found to cases of sloughing of the cartilage resulting from the use of the x-ray. Tempea and Gilbuzoianu report 5 cases with good results. They recommend deep roentgen therapy and aver that insufficient dosage acts only as an irritant. On the other hand, Thrane urges small doses repeated as needed as a preventive against the unfortunate complications which caused this form of treatment to fall into disrepute and disuse.

In this connection I wish to report 3 cases that have come under my care within the past two years.

Case 1.—J. A. D., a boy, age two years and five months, was seen first March 25, 1930. He had never had an audible voice. For some months dyspnea had gradually developed until the patient had considerable difficulty in breathing when asleep or when excited or crying. Otherwise he was in perfect health. The following day an examination was done with a Jackson spatula without anesthesia. The larynx was filled with papillomata which grew from both vocal cords as well as above them. A small bronchoscope was slipped into the trachea and a careful low tracheotomy done under novocain anesthesia. The patient was allowed to go home under the care of the family physician until the tracheotomy wound should have healed. In three weeks the patient was examined under ether and a large number of papillomata "expressed" very much as trachoma follicles are by some operators. No attempt was made to remove the bases. After expression silver nitrate solution 12.5 per cent was rubbed into the surface.

It was decided to try the use of the x-rays on this case and this was begun on April 21, 1930. He received 16 treatments between that time and November 18, 1930. The right and left sides of the neck in the laryngeal region were exposed alternately at first at intervals of one week and later at three week intervals. The dosage used was 5 milliamperes, 100 kilovolts; 4 mm. aluminum screen, 7 inch spark gap, skin anode distance 15 inches, time from 5 to 15 minutes.

Improvement was noted after 3 treatments and on July 8, 1930, no large papillomata were present. On August 26, only two small ones were seen, both on the left cord. On September 23, these were represented by two nodules which were pressed out. On November 18, 1930, my notes show "larynx looks normal". This patient has been seen at short intervals since and has continued perfectly well. The tube was removed from the trachea in January 1931. When seen last the larynx showed no sign of ever having been the site of trouble. The voice is slightly husky but this is probably due to lack of training as the child never had an audible voice from birth. The mother says that when he was an infant she had to get close to hear him cry.

Case 2.—Edith M., age 3 years, was seen first July 17, 1930. She had been hoarse for at least a year. Dyspnea had gradually developed for two to three months and was now alarming. This child had come 125 miles and the dyspnea was so great as to constitute an emergency. An immediate direct laryngoscopy was performed which showed the larynx filled with a papillomatous mass. As in the preceding case a small bronchoscope was passed into the trachea. This relieved the dyspnea and allowed a leisurely tracheotomy under local anesthesia. The patient had a marked bronchitis following the operation, with some fever and remained in the hospital for five days. She was then allowed to return home with instructions to return in three weeks. She was seen no more until June 25, 1931, eleven months later. She had had no treatment in the meantime and was entirely happy wearing the tracheal cannula. Under direct inspection the condition of the larynx was about as when last seen. One pedunculated mass attached to the anterior part of the larynx was partially removed without attempt to clean the base. Other papillomata were "squeezed out" and silver nitrate solution was applied. I suggested the use of the x-ray and arranged with Dr. W. J. Marquis to give the treatments. He began on July 10, 1931, when he treated the right side of the neck at the level of the larynx. The dosage was 100 kilovolts, 5 milliamperes, spark gap 7 inches, 4 m.m. aluminum screen; distance 18 inches; time 10 minutes. This was repeated on alternate sides on July 18, August 4, and August 11, 1931. The last two treatments were on October 30, and December 9, 1931, and were the same as above except that the time was only 5 minutes.

On August 19, 1931, examination showed a marked improvement. There was still considerable thickening in the anterior part of the larynx, but all discrete papillomata had disappeared. The condition of the larynx gradually improved until in October it was noted that the larynx showed no sign of previous disease. On December 10, the tracheal tube was removed. When last examined on February 20, 1932, the larynx was normal in appearance. The speaking voice was normal and the mother says the child sings a great deal at home. She is to report regularly for observation.

Case 3.—Norman J., age 4 years, was first seen July 27, 1931. He had been hoarse nearly all his life. He was operated upon for papillomata of the larynx in another city in November 1930, again a month later and again in June 1931. He seemed better for a time after the first two operations, but had been unable to speak at all since the last one. Examination with the direct laryngoscope showed the larynx filled with papillomata and granulation tissue. A bronchoscope was passed into the trachea and a low tracheotomy done under local anesthesia. X-ray treatments were advised and begun on August 21, 1931, when the same dosage was administered as in the above cases for 5 minutes to the left side of the neck, the right side received the same on August 24; and these were repeated on October 28, and November 2, 1931. The condition rapidly and progressively improved and in November the larynx was entirely free from papillomata and granulation tissue. There was some distortion of the larynx as a result of previous operative procedure, but it was not sufficient to interfere with free breathing. The voice, however, was hoarse. It was decided to continue the use of the tracheal cannula for a time and keep him

under observation. Unfortunately during the following month he was struck by an automobile while crossing the street and killed.

CONCLUSIONS

(1) Papillomatosis laryngis is a condition fraught with serious danger to the affected child. Although there is a certain tendency to spontaneous recovery, this tendency is not so great, or sure, as to justify us in pursuing an expectant attitude.

(2) A carefully done, low tracheotomy should be done in every case under local anesthesia. I feel that our method of introducing a small bronchoscope into the trachea as a preliminary step in the tracheotomy is a distinct advantage. The dyspnea, if present, is relieved and a careful, bloodless operation can be performed. Furthermore, the rigid tube in the trachea is a great help in young children where the neck is usually fat and the trachea extremely soft. Any possible danger of injury to the posterior wall of the trachea is obviated.

(3) Any attempt to remove the growths thoroughly by forceps, punches, or cautery is strongly to be condemned. Aside from their futility, the damage often resulting to the larynx is serious and largely irreparable. Some cases seen by me have suffered more ill effects from the operations than from the original trouble.

(4) Fulguration theoretically should be good, but the results reported do not justify its use. The difficulty in applying the current carefully to each of the small papillomatous masses is in itself sufficient cause to discourage its employment.

(5) Radium will undoubtedly cause disappearance of the growths. With proper regulation of dosage and exposure it is probable that a technic could be worked out that would insure a good result without danger of necrosis of the cartilages or serious synechiae and scar formation. At present, however, it is evident that we do not have such a technic. The relatively few cases coming under the care of any one man make the experimental study of this extremely difficult.

(6) It is my conclusion that the x-ray offers the best means in our hands today for treating papillomatosis. While I realize that these cases constitute a small number from which to draw conclusions and while sufficient time has not elapsed to test the permanence of the results, still the fact that in three successive cases the use of the x-ray caused a prompt and thorough disappearance of the growths with no injury to the larynx is not to be discounted. In two cases untreated before coming under my care the larynges are absolutely normal in appearance. In the third the papillomata disappeared and the only abnormality remaining was that resulting from previous operations. The testimony of others quoted bears out the efficacy of this form of treatment. The disagreeable complications noted from the use of x-ray treatment can easily be explained by faulty technic. In this connection it would seem that if each writer who published the result of his experience with the use of radium and the x-rays had given exact details of technic not only would more exact information have been available on the subject, but probably some serious damage to patients avoided.

The use of the roentgen rays with correct technic is simple, painless and provokes no disagreeable reaction. Should recurrence be noted the treatment can easily be repeated.

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DISCUSSION (*Abstract*)

Papers of Dr. Lee Cohen and Dr. John H. Foster.

Dr. T. W. Moore, Huntington, W. Va.—In all cases of laryngeal papilloma in the adult as well as in other non-malignant laryngeal affections, nasal obstructions such as polypi, deflected septums and hypertrophied turbinates, as well as diseased faucial and lingual tonsils and adenoids, should be given proper surgical treatment before we attack the larynx, or if an emergency condition exists, as soon after it has been met as is practicable. The author mentions this.

It is not always easy in cases of multiple recurring papillomata to remove all of the neoplasm and nothing more. Removal of too much is followed by scarring which may ever remain a cause of hoarseness or loss of voice flexibility. If we do this we have violated one of Jackson's important dictums relative to papilloma, namely, that under no circumstances is injury to the larynx permissible.

Protracted laryngoscopy is a great trial to both physician and patient, but Dr. Cohen must realize that suspension laryngoscopy also, even in the most skillful hands, is often far from a pleasant ordeal for the patient. I have been most agreeably impressed with the ease and extent of work that may be done through the Haslinger directoscope.

I am delighted to know that the use of radium in these conditions has been successful and that its dosage may be controlled to meet the needs of the individual patient. Unfortunately my experience with its use has not encouraged further trials. This is probably because it has not been applied by those familiar with its proper administration. I am glad that Dr. Cohen has warned us against its indiscriminate use because it is capable of causing injury equal to if not greater than that of papillomata.

Dr. Curtis F. Burnam, Baltimore, Md.—I assisted Dr. Cohen in the treatment of his two cases, so far as the radiation was concerned. The first patient had a cancer which had developed in a larynx long affected with papillomas and which had been treated over a period of several years. The patient was rather ill, was having a great deal of discomfort and, at the time of treatment, had a laryngeal cartilage necrosis. The treatment in this case was given as a substitute for laryngectomy.

In general, the intralaryngeal application of heavily filtered radium tubes, either through a laryngoscope or through a laryngeal fissure, has proved unsatisfactory. While a cure may be obtained, there always is danger of cartilage sloughs and of late strictures.

A certain number of laryngeal cancers are ray-sensitive and are curable by external crossfiring with teleradium or x-ray. I have one case of this kind which has been cured for more than 15 years.

Coutard, of the Curie Institute in Paris, employing his particular x-ray technic, reports favorable results in a number of cases.

Excellent results also have been reported by Douglas Harmer, of London, who fenestrates the larynx by removing a piece of cartilage and applying radium needles in the window thus formed.

The second case was treated entirely by x-ray, using a small portal from either side of the larynx. If the dosage is carefully given, it is possible to treat from the outside without any danger whatever of injuring the cartilage or other tissues of the larynx or the skin.

It is not desirable to be too didactic as to methods. In certain cases, it might be possible to combine to advantage mild intralaryngeal treatment with supplementary crossfiring from the surface.

We have cured laryngeal papillomas in children by both external and intralaryngeal radiation. A good many years ago I did a number of these cases with Dr. Samuel J. Crowe, of the Johns Hopkins Hospital. Our impressions were that laryngeal papillomas in childhood were not particularly sensitive growths and that the intralaryngeal dosage necessary to cure was fraught with too much danger of stricture to be justifiable.

Further cases should be treated in the way Dr. Foster reports in order to determine how universally applicable the method is and what results can be looked for. It may be that the cases he has had were unusually ray-sensitive.

Dr. Joseph B. Greene, Asheville, N. C.—So far as I can recall this is the first time this subject has been on our program since the organization of this Section in the Southern Medical Association, nearly twenty years ago.

Its importance is made very real to us when we recall that papilloma is the most frequent benign growth occurring in the larynx, and also that it carries with it a high mortality from obstruction to respiration.

The diagnosis of this condition is relatively easy, the history suggesting the lesion which can readily be confirmed by inspection, usually by the direct method. The mistaken diagnosis usually made by the family physician is that of bronchial asthma. Jackson reports 27 such errors referred to his clinic. Enlarged thymus, also, may be suspected. One such case referred to me came with a suggestion for x-ray treatment preparatory to a tonsillectomy. A foreign body in the air passage may be suspected, though the history of the case should point to the correct diagnosis.

Results with the use of radium in the hands of New, reported in 1921, were fairly satisfactory, though the difficulty of the technic places this method beyond the reach of most of us. The danger of radium, except in the hands of one as skilled as New, is too evident to need further comment. His method of application has, in the main, been without attempt at surgical removal. This, in my opinion, explains his relatively good results as compared with others who have practiced surgical removal prior to the application of radium. Fulguration was applied by Hubbard in 1915, but has not found general acceptance. The difficulty of confining the spark to the area involved, together with the hazard of explosion under ether anesthesia, has lessened our enthusiasm for this method.

Many of you recall the wonderful skill displayed by the late Dr. Lynch in the removal of these growths by dissection under suspension. He, later, with his accustomed frankness, abandoned this procedure. It may be of interest to quote from Dr. Lynch's discussion in 1929 of Dr. Tobey's paper on "Endothermy in the Treatment of Papilloma of the Larynx." He said: "I am sorry to say that my experience cannot approach that of Dr. Tobey. I have dissected and coagulated after the method he has described. I have removed papilloma, the big mass first, and coagulated the base. I have done everything that anybody that I have read of has appeared to do in the way of curing papilloma of the larynx, and about the time that I think, 'This is the method of choice,' I have recurrences and disappointments, too. Papilloma apparently belongs to that class of things which will not follow a rule." In a discussion of this subject at another time he said: "Finally, I have cauterized the growth with the actual cautery, and with this method I have gotten the best results with the least sittings."

One can readily appreciate the ease of a tracheotomy in the presence of a bronchoscopic tube, yet the possible danger of transplanting the growth to the trachea, an undesirable happening, occurs to me. This may be only a theoretical consideration which has no practical significance.

The excellent results obtained by the essayist may not be due entirely to the x-ray treatment, but to other factors as well, namely:

(1) The preliminary tracheotomy which places the larynx at rest, a method practiced by Payson Clark in 1905.

(2) The superficial removal of the growth, or scalping, as advocated by Jackson.

(3) The use of a local application, 12.5 per cent nitrate of silver, after superficial removal.

Dr. Porter Stiles, Birmingham, Ala.—I have followed the Jackson method of treating laryngeal papillomata in children, which consists of snubbing off the growths from time to time until they no longer recur. This method requires a long time and the tracheotomy tube must be worn in many cases for several years. However, the larynx is not injured, and the patient gets permanently well as quickly as by any more radical procedure that I have so far seen employed. The x-ray treatment suggested and reported by Dr. Foster is certainly encouraging. I hope that a safe and dependable method of employing it will be worked out on a sufficiently large number of cases to justify its universal trial.

OVARIAN ABSCESS*

By Wm. T. Black, M.D., F.A.C.S.,†
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As the first Chairman of this Section the writer presented as his subject "The Conservative Treatment of Pelvic Infection." My present subject, "Ovarian Abscess," includes only a small per cent of pelvic infections, yet the pathology is so distinctive as to require separate consideration.

A hopelessly destroyed ovary is a definite surgical entity; therefore, what is considered conservatism for the usual gonorrheal infected case is not conservatism for an ovarian abscess. It is a mistaken idea that all pelvic inflammation should be treated alike, as much depends upon the etiology and pathology of the condition. Because of this variance in the cause and in the pathological condition it is unwise to wait for a definite set date before operating. Each case must be judged upon its merits, yet always allowing sufficient time for restoration before instituting surgical intervention. Delay for six months, a year, or two years, as advocated by some physicians in the presence of a destroyed organ, which is a menace to health and dangerous to life, is in the writer's opinion unsound in principle and a great economic loss to the patient and to civic institutions.

It is estimated that 85 per cent of acute pelvic infections are caused by the Neïsserian organism, and if they are treated conservatively, 85 per cent of these infections will become symptomatically well. The remaining 15 per cent of infections due to the Neïsserian organism will become operative. This paper deals only with a small per cent of this 15 per cent of cases.

Only when suppuration occurs in the ovary forming a tubo-ovarian abscess, is the gonorrheal pelvic infection considered. Not only is the tubo-ovarian abscess considered in this paper, but special emphasis is placed upon the ovary which is destroyed through the hematogenous route and upon ovarian disease caused by infection by contiguity of tissue. Small localized ovarian abscesses (of the corpus luteum) which may recover, leaving little diseased tissue as a sequel, are not under discussion. Only gross suppurative conditions which destroy the ovary are alluded to.

The suppurative ovary has not received the attention which it merits. Most authors refer to the condition in a casual manner when dealing with the subject of pelvic infections. A rather comprehensive search for information upon the subject has been unsuccessful. Articles published in English are very meager in number and information. The German, French and Italian writers have contributed much to the histology, pathology, and the various modes of infection of the ovary.

The writer, after observing a series of tubo-ovarian abscesses over a period of several years, believes that the suppurating ovary should be differentiated from the usual type of pelvic infection and treated as a separate surgical entity. It does not respond to treatment as does the usual case of pelvic infection. It differs clinically; and the laboratory tests do not show improvement as rapidly as they do when the ovary is not suppurating.

There is considerable difference in the etiology and the symptoms produced, depending upon whether the gonococcus is the cause, or whether the ovary is alone involved (pyo-ovarium). The majority of abscesses occurred in the 15 per cent of patients who were sent into the hospital for surgical treatment after conservatism had failed. Especially does conservatism fail in cases of tubo-ovarian abscess (gonococcal). Other abscesses were encountered in conjunction with fibroids and other pelvic disease.

In a previous report the writer reported the occurrence of 100 suppurating ovaries in 1,389 operative pelvic cases, which gives an occurrence of 13.8 per cent. Chromé reports suppurating ovaries occurring in Tarnier's Clinic in 15.45 per cent of 110 cases of salpingitis. In

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this series of 100 cases the Neïsserian organism was responsible in 87 per cent of cases.

Gonorrhea is an intraperitoneal infection until the door is closed to the peritoneal cavity. If this ostium, or door, closes before the ovary is involved, the disease spends its ravaging effects upon the tubes, but if the fimbriae become attached around a recent dehiscence or ruptured graffian follicle, the Neïsserian organism finds a most favorable medium for growth and as a sequel a tubo-ovarian abscess occurs. The pus in such cases is often sterile, but the staphylococcus and colon bacillus were present in a number of cases. In 12 cases of pyo-ovarium the organism responsible was the streptococcus. In one case the tubercle bacillus was responsible.

Various organisms have been reported in ovarian abscesses, namely: staphylococcus, gonococcus, streptococcus, colon bacillus, typhoid, paratyphoid, tubercle bacillus, and other organisms. The pyo-ovarium occurring concomitantly with or secondary to infections from fibroids, uterine carcinomata, criminal abortions, polyps and pessaries have invariably been due to the streptococcus.

Just how the organism reaches the isolated ovary from the uterus is somewhat conjectural. Championniére and others taught (and it continues to be taught) that the lymphatics are responsible, but this theory is refuted by the investigations of Poiriér, Cornét, Bauereisen and Chromé. Poiriér injected mercury into the corpus uteri; the seven or eight lymphatics rapidly filled leading off from the uterus, extending up to a point opposite the fifth lumbar vertebra. There the mercury descended only 2 or 3 cm., but never reached the ovaries.

Cornét, and later Bauereisen, injected tubercle bacilli into the uterus, which resulted in tuberculous lymphangitis with an involvement of the inguinal, preaortic and other glands, but the ovary remained free from infection. Chromé's study of puerperal infections found a marked lymphangitis in the broad ligaments and other lymph nodes, but no infection in the ovaries.

These investigations are convincing and one must believe if these deductions are correct that infection of the ovary takes place only by contiguity of tissue from the uterus. Rupture of a hollow viscus (especially a ruptured suppurative appendix) may infect the ovary if a recent ruptured follicle has occurred. The hematogenous route is an etiological factor and may be responsible for one-sided pain in the acute pelvis, accompanying or immediately following puerperal infection, typhoid, variola, parotitis, influenza, pneumonia, and other infectious diseases.

The pathology differs, depending upon the organism. The tubo-ovarian abscess is, in the writer's opinion, gonorrheal. When the infection comes from other diseased tissue, the organism is usually the streptococcus (90 per cent of cases) (*Case 1*). In infections via the blood stream we have a pyo-ovarium in the absence of other pelvic disease (*Case 5*).

Cases 2, 3 and *4* represent typical tubo-ovarian abscesses due to gonorrhea and demonstrate the futility of waiting as long as some physicians advise before operating.

These 100 abscesses varied in size from a lime to a large suppurating ovarian cyst, extending up to the umbilicus. The locations were as follows: right side, 30 times; left side, 28 times; bilateral, 26 times; and location not designated, 16 times. The only other reference to location which I have been able to obtain is from the clinic of Chromé. Chromé reports that of 17 ovarian abscesses 16 were on the left side and one on the right side. In one case an abscess occurred on both sides.

In a tubo-ovarian abscess the early symptoms are masked by other pelvic disease, and not until sufficient time has elapsed to permit the inflammatory exudate to be absorbed will one be enabled to make a differential diagnosis. After the exudate has been absorbed, a circumscribed fluctuating mass remains, which clinically suggests an abscess. This mass will not entirely regress, and the laboratory tests will not become normal.

In pyo-ovarium complicating large tumors, or from uterine infections, the symptoms are more persistent, and if a parametritis is present, the diagnosis cannot be made until the inflammation has subsided. In case of large fibroid tumors the pyo-ovarium is not usually recognized until operation. In uterine infection complicated by a pyo-ovarium without a parametritis, or a large tumor, an acute abdomen accompanied by an enlarged tender ovary aids in the diagnosis. During an attack of an infectious disease in a normal pelvis the acute abdomen with a painful mass to one side of the uterus plus the history and laboratory findings is indicative of a hematogenous infection.

A tuberculous ovarian abscess is usually accompanied by nodules in the pelvis and constitutional symptoms. Menorrhagia is an early symptom of an ovarian abscess, unless both ovaries are synchronously destroyed. One patient with bilateral abscesses had amenorrhea for five

months dating from the beginning of her illness. The prognosis for recovery by operative interference in the tubo-ovarian abscess is good; while the streptococcic pyo-ovarium is serious, since it is a complication of a co-existing infection elsewhere.

The treatment of an ovarian abscess where the ovary is essentially destroyed is its removal. The paramount question is, when should it be removed? The stage of the infection, the offending organism, the presence of other pelvic disease, and the physical condition of the patient answer this question.

If the offending organism is the gonococcus, producing a tubo-ovarian abscess, the patient should not be operated upon until the inflammatory exudate has disappeared or has regressed. Many of these patients were treated weeks and many times months before being subjected to an operation. Some patients had a rise in temperature, a leucocytosis and a quick sedimentation time when admitted to the hospital. The rule of the University of Tennessee Clinic is to wait until the temperature has been normal for several days, the leucocytes having dropped to 7,500, or below, and the sedimentation time to 90 minutes before operating upon pelvic inflammatory masses (Maury). This is an excellent rule to follow in all cases of the usual pelvic type and it has reduced our mortality. If, however, a tubo-ovarian abscess is present, it is exceptional for the sedimentation time ever to reach 90 minutes. In cases where one is confident of his preoperative diagnosis it is unwise from a physical, as well as an economic, standpoint to delay as long as one would in an uncomplicated case without an ovarian abscess.

The degenerated, infected fibroid and the infected cancer case will also fail to reach the desired 90 minutes sedimentation time, nor will the temperature or leucocyte count reach normal. Therefore, the above conditions complicated with an ovarian abscess will require surgery earlier than those that are uncomplicated.

The cellulitis case, "frozen pelvis," following a criminal abortion or other causes, must be treated symptomatically until the cellulitis clears up. As 90 per cent of such infections are due to the streptococcus, operation is never safe, but often imperative. In hematogenous suppurations of the ovary (pyo-ovarium) surgical intervention should be instituted as early as the physical condition of the patient permits.

General surgical principles should guide one in dealing with the tuberculous abscess. Large suppurating ovarian cysts, when localized in Douglas' cul-de-sac, should have a preliminary colpotomy some time before a laparotomy. Meticulous care should be exercised in the removal of a pyo-ovarium, for the reason that the streptococcus is the usual offender, and a rupture may mean peritonitis and death.

Tenani reports a case in which rupture occurred during the second stage of labor, in which generalized peritonitis developed. A postmortem on the third day revealed such a rupture and the streptococcus was cultured.

As one is dealing with a destroyed organ with possibilities of a rupture, and death, good surgical judgment and extirpation as early as is compatible with desired results are advisable.

The following 5 cases illustrate the various modes of infection and the principles incorporated in this paper:

Case 1.—B. K., colored, 30 years old, was admitted to the Memphis General Hospital July 19, 1932. She had been ill for seven years. She noticed a mass in the lower abdomen seven years previously. A diagnosis of fibroid tumor was made with chronic pelvic infection. The patient ran a temperature of normal to 100° until operation on August 15, 1932. The blood count was as follows: 9,050 whites, 62 neutrophils, 18 lymphocytes, and 3,020,000 reds. The Kahn test was negative. The sedimentation time varied from 7 to 18 minutes for 26 days. The pathologist's report was as follows:

A submucous adenoma, intramural and subserous leiomyofibromata, chronic salpingitis were found, and a left ovarian abscess with hemorrhage. Culture of pus from the ovary showed streptococci.

This ovarian abscess was thought to be due to an infected, degenerated, fibroid tumor of the uterus. A perisalpingitis was present. A month after her admission she continued to have the same symptoms that she had upon entrance. Finally she was operated upon for reasons of expediency.

The patient in the adjoining bed presented similar symptoms and was operated upon the same day. The pathological condition was similar, with this exception: a tubo-ovarian abscess with a negative culture was found, while the other patient had pyo-ovarium with a streptococcic infection. The first patient had a stormy convalescence. The patient with tubo-ovarian abscess made an uneventful recovery. The first patient had a streptococcic abdominal wound infection. These two cases illustrate the difference in etiology, and the seriousness of a streptococcus infection.

Case 2.—Mrs. C. S. P., age 22 years, white, entered the Baptist Hospital January 7, 1932. She had contracted gonorrhea in September, 1931. She had been confined to the bed several weeks before her admission to the hospital. Her temperature upon entrance was 101°, but it was normal 10 days before her operation. The blood count was lymphocytes 20, polymorphonuclears 80 per cent, leucocytes 8,850, sedimentation time

was 8 minutes. The urine contained albumin and many red cells.

On pelvic examination an oval shaped fluctuating mass was found on the right side. Her physical condition was good and the abdomen flaccid. A tubo-ovarian abscess was diagnosed preoperatively from the history and physical findings. She was operated upon January 19, 1932. A large tubo-ovarian abscess on the right side was found and a pyosalpinx on the left. *Bacillus coli* was cultured from the ovarian abscess. Pus from the tubes was sterile. She had an uneventful recovery.

Although the temperature was normal for 10 days, the sedimentation time was 8 minutes, showing the sensitiveness of this test. The physical findings were relied upon in determining when to operate. Laboratory findings would probably have remained abnormal indefinitely.

Case 3.—Mrs. H. L. R., white, age 20 years, was admitted to the Baptist Hospital July 25, 1932. She had one child, 6 months old. She gave a history of Neisserian infection for 5 months. She was in bed with pelvic peritonitis during March, 1932. Vaginal examinations revealed a large oval-shaped fluctuating mass on the right side with some thickening on the left. Blood count was hemoglobin 90 per cent, red cells 4,770,000, whites 12,650, small lymphocytes, 24 per cent, polymorphonuclears 74 per cent, eosinophils 2 per cent and sedimentation time 27 minutes.

She was free of temperature for ten days before operation. She was operated upon July 26, 1932. There was a large tubo-ovarian abscess on the right side and chronic salpingitis on the left. The pus was sterile. She was discharged August 14, 1932. Recovery was uneventful.

This case demonstrates the greater sensitiveness of the sedimentation test in the presence of infection, even when the temperature has been normal for ten days. It also demonstrates the unnecessary waste of time in deferring an operation for months or years as is sometimes advised.

Case 4.—Mrs. W. E. G., age 27 years, had contracted gonorrhea three months previously. She was the mother of three children. She was confined to bed 7 weeks before entering the Baptist Hospital. Her temperature ranged from 98 to 101° until 10 days before operation, June 27, 1932. There were many pus cells in the urine. Hemoglobin was 70 per cent, red cells 3,590,000, whites 16,000 upon entrance and 9,560 before operating, small lymphocytes 10, polymorphonuclears 85 per cent, eosinophils 2, myelocytes 3, and sedimentation time 18 minutes.

A large circumscribed fluctuating mass was present on the right side with some enlargement on the left. On operating a large tubo-ovarian abscess was found on the right side with chronic salpingitis on the left. Recovery was uneventful. She was discharged on July 10, 1932 in splendid condition. This case demonstrates that it is unwise to keep a patient in the hospital indefinitely waiting for the sedimentation time and other laboratory tests to become normal when a tubo-ovarian abscess (gonococcus) is present.

Case 5.—Miss L. J., white, age 22 years, virgin, single, was admitted to the Baptist Hospital on April 10, 1932. She gave a history of influenza followed by a severe type of pneumonia in November, 1931. The pneumonia was followed by pelvic pain on the left side, which was succeeded by uterine hemorrhage, with a subsequent menorrhagia. She stated "that it was necessary for her physician to insert a vaginal pack a few times to control bleeding". From the history she had been running an irregular type of fever since the pneumonia.

The blood count was hemoglobin 40 per cent, and red cells 2,180,000, and the urine was negative. She had lost a great deal in weight, was very nervous and had been bleeding for the previous 6 weeks at the time she consulted me, in March, 1932. She was treated for the anemia before she was operated upon, April 11, 1932. Bimanual examination revealed a large lump about the size of a goose egg to the left side of the uterus. At operation a suppurating ovary was found. Other organs were negative. A positive culture of the streptococcus was obtained. This case demonstrates an infection of the ovary via the hematogenous route.

SUMMARY

This summary does not include the five above reported cases.

Out of the previously reported 100 cases there were two deaths from shock (in severe cases) among 87 tubo-ovarian abscesses (mortality 2.29 per cent). The mortality in pyo-ovaria occurring concomitantly with infected, degenerated fibroids was 33 per cent. Four cases died either from peritonitis or shock. One tuberculous case died several weeks later from general tuberculosis. (Among 44 private cases there was no mortality.)

In 1,389 operative cases, ovarian abscesses were present in 13.8 per cent. The average preoperative hospital days were 18.1 per cent. The average postoperative days were 14.1 per cent. The average sedimentation time was 26.37 per cent.

CONCLUSIONS

(1) An ovary destroyed by pus must be removed.

(2) All tubo-ovarian abscesses are Neïsserian in origin.

(3) Eighty-seven of 100 suppurating ovaries in this series were tubo-ovarian abscesses.

(4) Among 1,389 operative pelvic infections, suppuration of the ovaries occurred in 13.8 per cent.

(5) Pyo-ovarium is due to the streptococcus in 90 per cent of cases. It is much more serious than the tubo-ovarian abscess.

(6) In the tubo-ovarian abscess the laboratory findings are slow to become normal and the most valuable test, the sedimentation test, fails to reach the safe limit of 90 minutes after repeated tests. Therefore, to operate earlier

Table 1

COMPARISON OF BLOOD COUNT AND SEDIMENTATION TIME IN CASES OF TUBO-OVARIAN ABSCESS

No.	B. C.	S. T.	Operative Findings
34	12/31 14,400 P. 71 1/7/30 12,150 P. 49 1/10 10,050 P. 41 1/14 8,850 P. 40 1/19 8,700 P. 77	12/31 42 minutes 1/5/30 19 minutes 1/8 42 minutes 1/11 62 minutes 1/14 50 minutes	Left tubo-ovarian abscess; right chr. ooph. salp. 1/16/30
35	3/4 8,000 P. 64 3/17 7,200 P. 70 3/25 12,900 P. 81 4/1 11,600 P. 76	3/4 50 minutes 3/17 80 minutes 3/22 45 minutes	Left tubo-ovarian abscess; prophy. appx. rt. salp. 3/23/31
36	5/7/30 8,000	5/10 13 minutes 5/14 17 minutes 5/18 14 minutes 5/24 9 minutes	Right tubo-ovarian abscess; app. retroversion of uterus 5/29/30
38	6/24 10,450 7/2 24,950 7/6 13,500 7/14 16,000 7/28 11,900	6/23 8 minutes 7/19 23 minutes 7/28 10 minutes 8/4 20 minutes	Lt. salp. ooph. app., tubo-ovarian abscess 8/7/30
41	10/10 13,151 P. 80 10/22 13,600 P. 59 10/28 11,660 P. 76	10/13 50 minutes 10/18 20 minutes 10/22 33 minutes 10/28 28 minutes	Left tubo-ovarian abscess; uterine mucous polyp 10/26/29
24	1/2 9,750 P. 62 1/10 11,500 P. 75 1/14 9,700 P. 62	1/3 12 minutes 1/8 24 minutes 1/14 22 minutes	Chr. uni. tubo-ovarian abscess, chr. uni-peri-salp-ooph., peri-appx. 1/23/30

Table 1 (Continued)

No.	B. C.	S. T.	Operative Findings
25	10/29 9,150 P. 82 11/5 10,050 P. 74 11/13 8,450 P. 76 11/29 10,400 P. 75 12/12 8,700 P. 65	10/29 10 minutes 10/30 8 minutes 11/2 10 minutes 11/6 8 minutes 11/9 9 minutes 11/11 15 minutes	Tubo-ovarian abscess, simp. cyst of left ovary 11/14/29
26	4/2 12,800 P. 73 4/12 14,500 P. 79 4/19 8,400 P. 68 4/28 9,500 P. 59	4/3 11 minutes 4/11 28 minutes 4/19 15 minutes 4/25 13 minutes 5/3 27 minutes	Uni. tubo-ovarian abscess, uni. hydro-salpinx. 5/5/29
27	11/28 7,000 P. 77 12/7 4,950 P. 66	11/28 34 minutes 11/25 33 minutes 11/29 13 minutes 11/30 13 minutes 12/3 12 minutes 12/8 11 minutes	Bil. tubo-ovarian abscess 12/8/30
33	9/5 7,500 P. 77 10/1 9,700 P. 75 10/6 9,500 P. 79 10/11 8,400 P. 63 10/19 8,850 P. 63	9/6 23 minutes 9/10 36 minutes 9/17 42 minutes 9/24 30 minutes 10/19 54 minutes	Chr. tubo-ovarian abscess, chr. sup. salp. 10/22/30
46	3/28 6,350 P. 70 4/2 14,400 P. 83 4/15 8,050 P. 69 4/23 7,400 P. 70 5/30 6,700 P. 77	4/15 43 minutes 4/19 53 minutes 4/25 41 minutes 5/1 45 minutes	Right tubo-ovarian abscess 5/20/29

than customary is conservatism. A great economic loss is sustained if operation is postponed indefinitely.

(7) The clinical findings should be relied upon more in deciding when to operate, when laboratory tests fail to reach normal.

(8) The etiology, the bacteriology, the pathology and symptomatology are quite different in pyo-ovarium than in tubo-ovarian abscess.

Table 2

BLOOD COUNT AND SEDIMENTATION TIME IN ABSCESSS ACCOMPANIED BY FIBROID

No.	B. C.	S. T.	Operative Findings
57	2/4 9,800 P. 69	2/6 25 minutes 2/9 25 minutes 2/14 19 minutes	Uni. ovarian abscess; uni. chr. salp.; uni. chr. ooph.; myomata of uterus; prophy. appx. 2/19/30
58	1/8 9,450 P. 65 1/20 11,950 P. 62	1/8 21 minutes 1/14 20 minutes 1/20 21 minutes	Mult. fibromyomata uterus; chr. bil. salp.; chr. uni ooph.; uni. ovarian abscess 1/22/30
59	11/21 7,700 11/25 6,700 P. 50 11/28 9,000 P. 65 12/7 10,700 P. 67	11/23 25 minutes 11/28 36 minutes 12/3 30 minutes 12/7 25 minutes	Right ovarian abscess; fibroma of uterus 12/8/30
51	10/4 15,000 P. 93 10/9 10,700 P. 84 10/15 10,000 P. 73 11/6 4,500 11/15 6,200 P. 66	10/7 10 minutes 10/13 10 minutes 10/14 9 minutes 11/3 9 minutes 11/11 14 minutes	Bilateral ovarian abscess; myoma of uterus 11/18/29
54	10/21 9,700 P. 73 10/27 9,900 P. 75 11/4 8,600 P. 73 11/16 8,000 P. 61	10/21 16 minutes 10/27 15 minutes 10/31 17 minutes 11/4 21 minutes 11/11 36 minutes 11/14 35 minutes 11/16 47 minutes	Right ovarian abscess; fib. uterus; chr. appendix 11/19/30

(9) In pelvic inflammatory disease a tubo-ovarian abscess should be differentiated from pathological conditions which may undergo resolution and radical treatment should be instituted earlier than is customary in the usual case.

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DISCUSSION (*Abstract*)

Dr. A. David Willmoth, Louisville, Ky.—In going over our own work for a number of years, I am con-

vinced that abscess of the ovary as a primary condition is rather rare. I have seen few cases that could be so classified and the essayist has seemed to have had a rather rich experience in such cases. Perhaps it is because he has been looking for them.

Cases in which we believed a diagnosis of ovarian abscess was justified, were preceded by an acute appendix, in which instance the right side was of course involved, or the complication followed a septic gonorrheal infection of the pelvic organs, a streptococcic sore throat, or one of the acute exanthemata, parotitis especially had been the offending cause. Tubo-ovarian abscess is quite another thing.

The diseased tissue seen at operation is usually so extensive that one is in doubt as to where the primary infection began. When the case is first seen, certain symptoms present, together with the history, may be of assistance in making a diagnosis. First, the pain complained of is usually more severe in ovarian infection than in the ordinary pelvic involvement.

As nothing except the most extraordinary case of gall bladder infection gives the board-like rigidity in the right upper abdominal quadrant which a perforated duodenal ulcer gives, so also, nothing in the right lower quadrant gives the agonizing pain and tenderness that an infected ovary produces. If both ovaries are involved then both sides of the pelvis present equal symptoms.

A careful history taken to elicit a previous infection, abortion, or careless instrumentation may aid in arriving at the correct conclusions. So also may the menstrual history help, since here as in operations on the ovary frequent uterine bleeding is the rule, and if the attack comes on near or at the menstrual period, the severe dysmenorrheal pain together with sickening pain during bowel movements should be a signboard directing us to the ovary as the possible factor. Chills and chilly sensations are also of importance in these cases. We must constantly bear in mind that ovarian infection is rare, and in the absence of any history of previous infection such as referred to above, ovarian abscess as a separate entity perhaps does not exist.

The essayist dwelt upon the importance of the sedimentation test. I regret that our experience does not permit my agreeing with this assertion. No well established method seems to be universally used in sedimenting the blood. The personal equation of the laboratory worker enters so largely into the results that we have not found it of certain diagnostic value.

Again it has been shown that a number of factors may be involved which operate to produce a sinking velocity of the cells greater than the normal. Of these the principal one is the increased agglutination of the red cells, apparently due to the changes in the colloidal composition of the plasma, increase in its globulin, and decrease in its albumen fractions. These changes in plasma protein favor agglutination by increasing its viscosity and by diminishing the electrical charge of the corpuscles, which increases the tendency to aggregation.

The chief indictment against its certainty in diagnosis, is the fact that after a herniotomy with perfect healing and no evidence of infection, the rate of corpuscle sinking increases in twenty-four hours and persists until healing is complete. This lessens the value of the sedimentation test in acute infections.

On the other hand we have found the left shift in the Schilling differential count to be accurate. When the staff count is as much as 10 per cent we are sure that we have an acute process, and when it reaches 15 we are sure of abscess formation, or at least very active processes going on in the tissues. The higher the count the more severe the infection and the higher the mortality. The leucocyte count in many cases may be little if at all increased.

When laboratory reports indicate pus formation, together with the clinical findings of a doughy mass in the cul-de-sac, intensely painful on palpation, with an elastic sensation to the examining finger like that from an inflated rubber balloon, one is justified in at least using an exploratory needle through the vault of the vagina to ascertain if pus has formed. No real harm can come from this, as the infected ovary always sinks into the cul-de-sac on account of its increased weight. Should pus be found a colpotomy should be done.

On the other hand in gonorrheal cases, where pus formation is not certain, expectant treatment should be the rule until reasonable safety exists before the abdomen is opened. In streptococcic infections no one can foresee when operation is safe and all the time should be allowed that clinical symptoms permit. The longer the time from the acute process to operation the less the risk, and vice versa. Even after months we may encounter and open up virulent infection that may prove fatal to the patient. It has been our custom for years to use a 2 per cent alcoholic solution of iodine in the abdomen of all these patients. We feel sure that it increases the patient's chances for recovery and does not, as some suppose, induce adhesions.

When tissues, be they ovaries or tubes or both, have become distinctly pathological and have ceased to function normally for the patient, the case is already sterile and the structures should be removed as promptly as surgical judgment permits.

BLEEDING DURING THE PUERPERIUM*

By ROBERT A. JOHNSTON, M.D.,
L. A. MYERS, M.D.,
and
HERMAN W. JOHNSON, M.D.,
Houston, Tex.

A bloody vaginal discharge continuing for five or more weeks after delivery has not been a rare or unusual finding in our experience. Since we are taught that the lochia should stop by the fourteenth day postpartum, its continuation may be regarded as abnormal. Williams says of the lochia: "If the reddish color persists for more than two weeks, it indicates the retention of small portions of afterbirth or imperfect involution which is frequently associated with retroflexion of the uterus." The bleeding may be daily or may recur intermittently every day or so. Hirst notes that the reappearance of bright red blood about the third week postpartum is

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a common occurrence and he attaches very little significance to it. A review of some of our early text books on obstetrics states that the lochia frequently persists for four weeks. In none of our cases has the bleeding been very profuse or caused serious concern to the attending accoucheur. To the patient the constant wearing of vulval pads and on some occasions being ordered back to bed until the bleeding ceases has been rather annoying. In the eyes of the laity, and especially to the friends of the patient, being compelled to go back to bed after once being up means some flaw in the obstetrical care of the patient.

In order to determine whether bleeding during the puerperium is rather universal or only characteristic of our private patients, a careful inquiry was made of all patients returning to the postpartum clinic of Hermann Hospital in Houston, Texas, six weeks after delivery. It was found that approximately 12 per cent of the patients bled off and on for four weeks after delivery and 5 per cent were still spotting at the sixth week when they visited the clinic. A similar observation in a large Eastern clinic was made by one of the authors (R. A. J.) on a limited number of patients returning for their postpartum examination and the findings were practically the same. Such findings correspond with those met with in our private practice.

Naturally the question arose as to what causes some women to stop bleeding by the tenth day, while others continue to flow for six weeks; also, whether such bleeding during the puerperium should be considered normal. It was hoped that a careful survey of our obstetrical practice would throw light on the matter. To rule out infection as a probable cause of the bleeding, it was found that the progress of labor in our cases was usually followed by rectal examinations. When vaginal examinations were made a strictly sterile technic was carried out, in addition to instilling mercurochrome in the vagina. Further study of the records shows that our morbidity is low and infection is rather infrequent. It was thought that the cause of the bleeding might be found in improper care during the third stage. To obviate this possibility, special precautions were taken that no attempt be made to express the placenta too early, but only after it had separated spontaneously. We have employed the usual method of expressing the placenta from the vagina. It is our habit to inspect each placenta to note whether the cotyledons are intact. The use of pituitrin and the administration of ergot by mouth every four hours for six doses after delivery has been our routine for the past six years. Too hasty expression of the placenta and retention of pieces of afterbirth should also be eliminated as possible causes of bleeding. Since our patients are all private, it is rare for any one of them to have to resume her household duties early. The majority have servants or nurses who relieve them of these cares for the first four to six weeks. It has been our practice to allow patients up in the chair for 30 minutes on the tenth day and to increase 30 minutes each day until they are able to be up as they desire. Quite a few patients remain in bed for 14 to 16 days because they desire to do so. We feel that too early returning to physical activities in our private patients plays no part in the bleeding during the puerperium. We advise the knee chest position and sleeping on the abdomen in our routine postpartum care.

For the past five years patients have been instructed to notify us if bleeding has not stopped by the twenty-first day after delivery. If this occurs, a second course of ergot is ordered and the patient is instructed to stay off her feet as much as possible. Ice bags over the lower abdomen are sometimes advised if bleeding seems rather free. In case the bleeding fails to cease by the twenty-eighth day, the patient is requested to come to the office for examination. At this visit, vaginal examination determines whether the uterus is well involuted or retroflexed. For the past five years at this visit or at the sixth week visit, if bleeding is present, on the office table without any anesthetic the uterine cavity is curetted very lightly with a very small curette. Following this, the vagina is packed high with sterile 2-inch bandage and the patient is allowed to go home with instructions to remove the packing in 24 hours. In all cases observed the cervical canal was patulous, allowing the curette to enter easily, and the procedure caused little, if any, pain. Dr. Howard A. Kelly reported this procedure in 1926 for diagnostic study when curettage was indicated. Because we realized the danger of passing a curette through a soft uterus, and also the danger of starting up an infection, the first few cases were performed with some hesitation. Thus far, over a period of five years, in over 150 cases, no untoward results have occurred and the bleeding has stopped completely by the fourth day in a great majority of cases. At times a large amount of tissue is removed, and for the past two years this material has been carefully washed and placed immediately in formalin. This report is a study of this material. In the past two years, in 996 private cases, uterine curettings have been obtained from 44 patients who came to the of-

fice because bleeding had persisted for four weeks or longer in spite of the usual measures. In no case where there was evidence of infection during the puerperium was curettage done. An analysis of the 44 cases having an office curettage shows the following facts.

Failure to nurse the baby was not a contributing factor in the continued bleeding during the puerperium, since only 4 out of 44 cases up to this time had weaned the baby. The type of labor was not particularly unusual. There was one breech extraction, two difficult mid-forceps and one podallic version. Spontaneous delivery or elective low forceps after episiotomy accounted for the remaining cases. In two cases the labor was prolonged, lasting over 30 hours. In three cases, toxemia of pregnancy was grave enough to necessitate induction of labor by rupturing the membranes after first administering castor oil and quinine. In only four cases were the babies excessive in size, weighing 9 pounds or more. As a rule, the babies weighed 7½ pounds. However, in 3 cases the weight was less than 6 pounds. Two children died during the first week of life. One fetal death was due to cerebral hemorrhage as a result of a difficult mid-forceps on a baby weighing 10 pounds, and the other was due to a congenital malformation of the intestines. Parity also played no part, as 21 cases bled after their first baby and 23 multipara were likewise affected. A careful check-up of the menstrual history of these patients showed them to be rather normal, while a few cases showed some evidence of endocrine disturbance, either irregular periods or obesity. Their number was not more than is usually found in an average series of patients. Only four of these patients were known to have retroversion during early pregnancy and on examination at the time of curettage the uterus was found to be retroflexed in 9 cases. From the work of Plass, Danforth, Galloway, Hunner and Wharton, this seems to be a small percentage, and it was much less than is observed in our other cases. A check on our patients showed that approximately 20 per cent had retroflexion during the early period of pregnancy. At the same time the uterus in a majority of cases was well involuted for the time which had elapsed since delivery. From this limited number of cases, one would naturally conclude that retroposition or retroflexion played very little, if any, part in the bleeding during the puerperium.

DISCUSSION

After the epoch-making paper of J. Whitridge Williams, which showed that the endometrium of the uterine cavity outside of the placental site regenerates in three weeks and that the placental site by an exfoliative process was replaced by normal endometrium in six weeks, it occurred to us that bleeding during the puerperium might not be an abnormal finding. However, since 38 patients stopped and remained free from bleeding in four days after an office curettage, the procedure seemed to warrant some consideration. Also, since over a period of six years there have been no untoward symptoms as a result of the practice, evidently it has caused no trouble. The following explanation of the results of this curettage is offered.

The uterine cavity is left irregular after expulsion of the placenta and during the process of degeneration and regeneration more irregularities develop due to proliferative changes in the stroma and in the epithelial lining. This is especially true at the placental site area. Regeneration by nature is not always perfect, as evidenced by a granulating umbilicus or granulating tissue found in case of a lacerated vaginal wall or perineum. Removal of granulation tissue allows the skin or mucous membrane to grow over the smooth surface. The curette smooths the irregular surface of the uterine cavity by removing excessive repair of nature, and bleeding ceases because the epithelial lining is quickly restored.

To substantiate such an assumption the microscopical findings of Dr. Meyer, pathologist of the Memorial Hospital in Houston, in the 44 cases are as follows: in no case were there found any chorionic villi as evidence of retained afterbirth. Infection could be ruled out by the absence of leucocytic infiltration, except in two questionable cases. Hyperplastic endometritis was rarely found, as in only three cases could it be suspected. The usual finding was an increase in the interstitial stroma and a proliferation of the glands of the endometrium. Hyalinized areas frequently occur, denoting most probably a scraping from the placental site.

SUMMARY

(1) Bleeding during the puerperium is rather a frequent finding.

(2) Curettage on the office table without an anesthetic in a limited number of cases has resulted in the cessation of further bleeding in the great majority of cases.

(3) Realizing the danger of indiscriminate employment of this procedure, I do not recommend it until further studies have been made.

However, no untoward symptoms have developed under our observation.

(4) Our assumption from these cases is that lactation, parity, retroflexion of the uterus, retained pieces of afterbirth, too early separation of the placenta, infection, and excessive size of the baby, play no part in the continued bleeding of the puerperium.

(5) It is hoped that this report will stimulate further study of involution of the puerperal uterus, so that our knowledge of the normal may become more definite.

DISCUSSION (*Abstract*)

Dr. W. T. Pride, Memphis, Tenn.—There is a difference, as I understand Dr. Johnston, between bleeding in the puerperium and hemorrhage. This type of case is the one that has a slight bloody discharge over a period of weeks. Its cause, in my opinion, is one of three things: (1) subinvolution, (2) displacements, or (3) retention of blood clots.

Also there is a possibility of a low grade inflammatory process; in other words, chronic endometritis, especially where the healing and the closing of the blood spaces are incomplete. As Dr. Johnston stated, occasionally the patient has to submit to a curettage. As a rule, the case which benefits by curettage is one in which subinvolution exists, due to granulation tissue and retention of old blood clots. The operation with rest in bed and some uterine contractant produces the desired results. It is possible that the pituitary gland may be involved as well as the ovary itself.

Dr. Thomas Benton Sellers, New Orleans, La.—Curettage which Dr. Johnston advocates is a reasonably safe procedure in his hands, but I wish to sound a note of warning against its indiscriminate use. I am sure that Dr. Johnston does not mean to convey the impression that he endorses the use of the curette as a routine office procedure in prolonged bleeding of the puerperium.

I am indebted to the late Dr. Henry Cocram for the technic of a simple procedure which has been invaluable to me in the treatment of abnormal bleeding during the puerperium. I use two intrauterine applicators wound with long narrow strips of cotton almost the entire length of the shaft of the applicator so that after its insertion into the uterine cavity the portion remaining outside is covered with cotton. One of the applicators is dipped in phenol, the excess acid mopped off and the applicator is inserted into the uterine cavity and gently rotated for about one minute. The other applicator is saturated in alcohol and also inserted into the uterine cavity and gently rotated for one minute. The vault of the vagina is then swabbed with a sponge dipped in alcohol to counteract the possible effect of phenol which may have dripped from the uterine cavity.

Of course, I realize that this simple procedure does not give us any scientific information as to the cause of the bleeding, and that for this reason it partly defeats the purpose for which Dr. Johnston uses the curette. Nevertheless, it has a definite clinical value, in my experience having proved almost 100 per cent effective in relieving prolonged bleeding during the puerperium. It is a safe procedure and, in contrast to curettage, may be recommended without danger as a routine measure.

Dr. M. Pierce Rucker, Richmond, Va.—If one will take the trouble to inquire of patients four to five weeks after delivery about the presence of a vaginal discharge, he will probably be surprised at the number who still have to wear a pad. In a fairly large number the discharge will have some color. I am sorry that I cannot give you the percentage in which this occurs in my own patients. I am glad that Dr. Johnston has shown us what is taking place within the uterus in these cases. From the character of the uterine glands in the tissue that he has removed from his patients one would think that possibly the ovary has something to do with the persistence of the bloody discharge. I should like to ask Dr. Johnston if he has had occasion to examine the ovaries in any of his cases.

The treatment has not given me any great concern. I usually refer my patients to the twelfth chapter of Leviticus and that seems to satisfy them.

Dr. Johnston (closing).—The warning sounded by Dr. Sellers in the indiscriminate use of the curette is timely. It is not our purpose, as yet, to sanction such a procedure. Our object in reporting these findings is to stimulate further study of the puerperal uterus. It may serve a purpose from a medico-legal aspect. Sex of the child failed to play a part as a cause of bleeding. In our hand, it has served a definite purpose in shortening the length of time of the bleeding and no bad results have occurred.

ACUTE INJURIES TO THE ABDOMEN*

By J. S. TURBERVILLE, M.D.,
Century, Fla.

Every physician is confronted at times with serious abdominal injuries and should have at least a working knowledge of the essential points in their diagnosis and treatment. However, since, according to Oliver J. Fay, there are no pathognomonic signs of hemorrhage or perforation, the problem cannot be simply stated. As the diagnosis of hemorrhage and perforation carries with it the duty to operate, it is necessary that we concentrate our study on these two phenomena.

Nature, in making our bodies flexible, exposed the contents of the abdomen to considerable danger of trauma. The liver, spleen, bladder, non-pregnant uterus and prostate have slight protection, the kidneys less, and the other abdominal organs almost none.

In a study of this question it is necessary that we have a good working knowledge of the surface topography of the viscera and the usual

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divisions by sagittal and segmental lines facilitate it. If we know the direction and point of impact of a given force, a fairly good idea can be formed regarding injury to the more fixed organs. Nevertheless, precious time must not be lost in making hair-splitting diagnoses, as it is necessary to determine only whether there is hemorrhage or perforation or both. The knowledge of the organs injured is helpful in planning the operative approach.

On account of the presence in the abdomen of much sympathetic nerve tissue, trauma produces shock often out of proportion to its intensity. This primary abdominal shock has to be considered in all cases. However, it is of short duration as a rule. Persistence of shock symptoms indicates a serious lesion and continued delay for recovery may allow hemorrhage and peritonitis to reach such a point that operation would be futile. Operation and control of hemorrhage is often the best means of combating shock. Flatness in the flanks and pelvis has been spoken of by nearly all who have written about intra-abdominal hemorrhage, but is of very little value ordinarily, because the rigidity and tenderness prevent its demonstration. The same thing can be said of the absence of liver dullness. In the latter, unless the patient is able to sit up and allow the gases to rise to the domes of the two leaves of the diaphragm, it cannot be shown. However, if a fluoroscope and tilt table are available, a half erect position will be sufficient to demonstrate the light areas above the liver and spleen.

No attempt will be made to diagnose injuries to individual organs; only the symptoms and signs necessary to determine the necessity for exploratory operation will be considered.

After all perforating wounds of the abdominal walls, immediate exploration of the abdominal cavity should be made. If the wound is too small to be explored by the finger, probes are of uncertain value, particularly in very muscular areas. This is also true to some extent of incision along the wound track, as here again we can be lost in a large muscle. If the wound is so situated that in following its track all parts of the abdominal cavity become accessible, it is good practice to follow it. In case of gunshot wounds a radiogram can often prevent an exploration by showing that the bullet has not perforated the abdominal wall. Often the radiogram tells you that the wall has been perforated, because the bullet is found in the wall directly opposite.

Close observation of the patient is necessary in every case in order to arrive at a timely diagnosis. The examination should be conducted in an orderly manner, and it should be something like this. Put the patient to bed and apply heat after removing wet clothing and wrapping him in blankets. Take the rectal temperature, take the pulse and blood pressure. As soon as the patient's condition will permit, have him void, or if he cannot, catheterize him. Inquire if he has vomited or if his bowels have moved, and as to the nature of the discharges. Blood counts can be made as a matter of record, but are of very little practical value, as often sweating and vomiting so concentrates the blood that dangerous hemorrhages may occur before any conclusions can be drawn from blood examination. Inquiry must be made concerning the nature of the force, the direction and posture of the patient at the time of injury. By a general survey of the accessible surfaces, and again by counting and feeling the pulse, an idea can be obtained of whether the patient is recovering from shock, and if so an examination of the abdomen can be commenced. This should be done in a systematic way. The supposed normal area should be palpated gently and gradual extension of the examination should be made till it reaches the point of supposed impact of the force. In no other way can proper comparisons be made. After palpation gentle percussion should be done by following the same scheme. Local tenderness, soreness and rigidity should be noted and their extent recorded. If the patient is sufficiently recovered, find out from him whether the location of the pain, soreness and rigidity are the same. In nearly all serious abdominal injuries, nausea and vomiting occur early. In injuries of the abdominal walls this is not apt to occur. Therefore, a history of nausea or vomiting, persistent abdominal pain, local or general soreness, and local or general rigidity following an abdominal injury, are sufficient evidence to indicate serious intra-abdominal trauma. If pallor is increasing, the pulse is more rapid, blood pressure falling and there is perhaps some restlessness, there is probably considerable hemorrhage. Fluid blood may or may not be demonstrated by percussion. In the presence of peritoneal soiling from perforation of hollow viscera, the degree of rigidity is usually greater, the pain more intense, tenderness more acute, the attitude of the patient is one of constraint, and breathing is shallow and painful, especially if the trouble is in the upper abdomen, and in injuries to the diaphragm. Liver dullness may or may not be absent in perforation, and theo-

retically the tympanitic note should be the same throughout the abdomen. As stated above, the fluoroscope in the half erect position is a much more reliable test. This latter will also demonstrate the presence in the thorax of abdominal organs, thus indicating rupture of the diaphragm. Do not give anything by mouth or rectum till a diagnosis is made, and then not till after exploration shows the integrity of the stomach, intestines and rectum. In case of suspected bladder rupture it is permissible to inject sterile saline through a sterile catheter to see whether it can be recovered.

Having made a diagnosis of hemorrhage or perforation or both, what next? During the period of shock and while the investigation is going on you may use any of your pet remedies for stimulation, but when the diagnosis of serious intra-abdominal injury is made morphine and atropine should be used freely, together with normal saline under the skin, while the preparation is being made for immediate abdominal operation. Careful study will indicate the site for the incision. The most conscientious study will at times leave one in doubt as to the presence of perforation or hemorrhage. In that case, do an exploratory operation.

Shoulder pain has been mentioned in connection with injuries to the liver and spleen. Shoulder pain may be noted, but it must be remembered that irritation of any portion of the diaphragm will produce the same complaint in the corresponding side. Therefore, as a localizing symptom it is of little or no value.

Only a few words will be said about treatment. Every inch of the intestine and their mesentery should be inspected where there is any possibility of injury. This can be done without evisceration, except in cases of great hemorrhage about the mesentery of the small bowel. In the latter event rapid delivery of the intestines is necessary in order to reach the bleeding points quickly. The intestines should be protected by warm towels. Wounds of the liver can and should be sutured in nearly all instances if sufficient exposure is made. By starting at the accessible portion of the wound, and leaving the ends of the sutures long, often when considerable traction is to be made you can have enough sutures to pull the liver down. Juilly does not hesitate to cut the ligaments of the liver to make accessible wounds that would otherwise be difficult of approach. Also he clamps gently the right edge of the gastrohepatic omentum, when this is necessary, to find the bleeding point or to suture the portal vein. The liver receives practically all its blood supply from the hepatic artery and portal vein, and the bleeding can be controlled by finger and thumb pressure at the foramen of Winslow. Large catgut sutures and large round needles should be used, and both the superior and inferior surfaces should be sutured, as no ordinary needle will reach through the thick portions of the liver. It is seldom practical to suture the spleen, its removal being safer and easier as a rule. Drains should always be placed in the soiled areas in perforations; in the pelvis where soiling or blood has reached this cavity; in the kidney pouches on the injured, or soiled side; in the vicinity of the injury in wounds of the liver, on account of bile leakage from suture punctures; through the foramen of Winslow or between the colon and stomach or through the mesocolon in injuries of the stomach or pancreas or left side of the liver in its deeper portion. The method of suturing the intestines and stomach is one of choice or experience, the essentials being to unite only viable tissue and clean thoroughly soiled areas. Suture of the bladder calls for an indwelling catheter, through the urethra or above the symphysis pubis as seems most practical; also drainage of the prevesical space is necessary. In injuries of the kidneys not associated with trauma to the other abdominal organs, there is usually no necessity for immediate operation. However, if there is much swelling and soreness in the loin prompt operation should be done in order to stop hemorrhage and urinary extravasation. Badly damaged kidneys can often be saved by careful suturing and drainage. Some, of course, will have to be removed if you can be certain the patient has another. In injuries of the kidneys, or ureters, associated with damage to intraperitoneal organs, drainage of the wounded area from the loins should be done in order to prevent the possibility of urinary soiling within the peritoneal cavity.

At this point I wish to say a word about shock in its relation to abdominal injuries. Most men who have written about these injuries have undertaken to differentiate shock and hemorrhage. I do not think this is possible. No definite idea has been formed concerning these symptom-complexes. We occasionally see soon after injuries or surgical operations patients with all the symptoms of shock, but instead of subnormal temperature, high temperature. This is noticed oftenest in injuries or operations about the head and neck, but may be seen in operations on the liver, or in crushing injuries of the extremities. Therefore, it must not be forgotten that shock is only a syn-

drome and is no doubt the result of several and varying pathological processes. Shock that lasts longer than 2 or 3 hours after proper remedies have been applied is an indication of serious intra-abdominal injuries and demands immediate surgical intervention. Shock must not become a bogie, else it might frighten the timid and prevent life-saving operations.

A word should also be said about hypodermoclysis, intravenous medication, and transfusion of blood. These are usually unnecessary in shock and futile in hemorrhage, except to hold the blood volume till the hemorrhage can be stopped. To pour fluids or blood into the veins to be poured out again in the abdomen is foolish, and may be harmful. Hemorrhage has a tendency to check itself by lowering blood pressure and if we fill the vessels and raise the pressure we often cause a return of hemorrhage. The least harmful measure is hypodermoclysis. After hemorrhage has been controlled, transfusion is indicated in the more severe cases.

I will not discuss mortality on account of the extreme variability of injuries and the consequent difficulty of classification. No doubt the mortality is increased by overlooking perforations of hollow viscera.

Shock and hemorrhage are responsible for nearly all the early deaths, peritonitis for most of the later ones, sepsis and embolism for a few.

Prognosis is doubtful in injuries of the liver, spleen and kidneys, bad in those of the pancreas and extremely bad in perforations of the hollow viscera, with the gravity increasing in injuries of the stomach and colon.

I am submitting excerpts of some of my cases to show the multiplicity and variability of the pathologic processes and the high mortality often encountered. The data concerning the patients' course between the time of injury and the operation were so incomplete that they have not been considered. However, the duration of the injury and the preoperative condition are most important factors in morbidity and mortality. Peritonitis can develop and spread in a few hours in perforations of hollow viscera. This was especially noticed in the injuries produced in the patient hurt by the broom handle. In not more than 6 hours there was widespread peritonitis.

I will conclude by saying that he who expects to accomplish anything in the treatment of these cases must be wide awake, painstaking in his studies, industrious, and intelligently courageous.

CASE REPORTS

Case No.	Condition Found at Operation	Death Yes or No	Source of Injury
1	Contusion of liver and penetration of thorax	No	Pistol
2	Laceration of liver, left almost torn from right lobe. Contusion of gastro-hepatic omentum and mobile part of duodenum. Gall-bladder detached from its bed, hanging only by cystic duct. Great deal of blood and bile in abdomen as far as the pelvis	No	Automobile accident, and man fell on him
3	Perforation of anterior and posterior walls of stomach and lower pole of left kidney. Moderate amount of blood in lesser peritoneal cavity, behind the peritoneum and above the left end of the transverse colon	No	Pistol
4	Perforation of left ileum and laceration of rectum. Peritonitis already well advanced	Yes	Pistol
5	Wound of left kidney and left thorax. No operation on kidney; later thoracotomy for empyema.	No	Pistol
6	Knife wound at insertion of origin of recti abdominal muscles. Exploration. No injury to abdominal contents	No	Knife
7	Severence of ileum and destruction for about 8 inches. Perforation of urinary bladder. Resection	Yes	Pistol
8	Contusion of liver and stomach. Some blood.	No	Pistol
9	Rupture of spleen, laceration of left lobe of liver and laceration of left border of gastro-hepatic omentum. Died 14 hours later with high fever (106°). Was suffocated during the anesthetic by vomiting and aspirating food into larynx. Necessary to stop operation and do artificial respiration	Yes	Log rolled on him
10	Laceration of diaphragm. Great destruction of liver and multiple perforation of stomach	Yes	Shotgun wound
11	Four perforations of small intestines and many of mesentery, all bleeding	No	Pistol
12	Perforation of ileum and severence of the right external iliac vessels with massive hemorrhage into the abdomen and behind the peritoneum	Yes	Pistol
13	Large collection of blood in lesser peritoneal cavity of week's duration	No	Jammed by log
14	Perforation of stomach, laceration of right and left lobes of liver. Died of gastric fistula	Yes	Pistol
15	Non-perforating wound of abdomen that entered perirenal fat	No	Knife wound
16	Bullet wound through right lobe of liver. Injury to third lumbar vertebra and shot in knee cap.	No	Pistol
17	Ruptured bladder, laceration of transverse portion of mesocolon, hematoma of mesentery of sigmoid, large retroperitoneal hematoma. Fracture of both pubic rami	Yes	Log fell on him
18	Perforation of transverse colon, contusion of lower border of pancreas, perforation of omentum. Died of peritonitis and alcoholic delirium	Yes	Pistol

Case No.	Condition Found at Operation	Death Yes or No	Source of Injury
19	Ruptured bladder (bladder torn from prostate), large retroperitoneal hematoma and prevesicle hematoma. Died 5 days later with peritonitis	Yes	Fell from scaffold
20	Perforating wound of stomach, mesentery and omentum, and perforating wound left side of thorax	Yes	Pistol
21	Transverse laceration of the ileum, contusion of the ileum, contusion of the colon, great contusion of abdominal wall	No	Lumber truck wheel rolled over him
22	Perforating wound of abdomen with slight bit of blood to anterior side of sigmoid in the pelvis. No perforations found on casual search	No	Knife wound
23	Two perforations of jejunum, one of duodenum. Great damage at the root of the mesentery. Great deal of blood in abdomen. Injury of lungs with large hemorrhage from the lungs. Anastomosis in two places	Yes	Pistol
24	Wound of abdominal wall, exploration for safety. No injury of viscera. Bullet under fascia lata left side just below crest of ileum	No	Pistol
25	Perforations of the ascending and transverse colon, cecum, and damage to the appendix and mesentery of small bowel. Operation 9 hours after injury. Died of peritonitis	Yes	Pistol
26	Perforation of jejunum and laceration of mesentery; great hemorrhage. Peritonitis	Yes	Pistol
27	Perforating wound of liver, left lobe, anterior and posterior portions. A good deal of blood in abdomen	No	Pistol
28*	Perforating stab wound, omentum plugging, explored. No visceral damage	No	Knife
29	Contusion of kidney, no operation	No	Hurt at saw mill work
30	Internal injuries of abdomen, thorax, and fracture of spine. Died of shock before anything could be done	Yes	Automobile accident
31*	Perforating wound of liver with considerable laceration and hemorrhage and penetrating wound of right lung with hemorrhage. Packed liver wound	No	Pistol
32	Through and through perforation and contusion of ascending colon near hepatic flexure	No	Pistol
33	Extensive laceration of liver and stomach (4 in. long), great soiling with stomach contents and considerable hemorrhage	No	Pistol
34	Transverse rupture of ileum, 2 places 1½ in. apart, side to side anastomosis, great soiling with blood and intestinal contents. Died of hemorrhage, peritonitis and shock.	Yes	Broom handle thrown by belt of machine
35	Great hematoma of abdominal wall due to child falling on abdomen and striking with elbow; no exploration	No	Blow in abdomen
36*	Stab wound with perforation of mesocolon at hepatic flexure	No	Knife
37	Stab wound of abdomen with laceration of liver. Incised wound of left upper abdomen that penetrated the abdomen, but no visceral damage found. Stab wound to right side and through sternum about midway that penetrated the right ventricle of heart. Died on table	Yes	Knife
38	Ruptured spleen and fracture of left ischial ramus	No	Automobile
39	Laceration of stomach. Pneumonia	Yes	Mule kick
40	Incised wound of liver. Incised wound of diaphragm and division of right costal arch	No	Knife
41*	Exploration. Contusion of omentum found	No	Automobile
42	Rupture of intestines. Peritonitis and shock	Yes	Mule kick

*Dr. J. I. Turberville.

*Dr. J. O. Lisenby.

Total cases of abdominal injury	42
Total deaths	17
Patients operated upon	38
Deaths	17
Total with hollow viscera perforated	19
Deaths	15
Operations for injuries which would not have proved fatal	9
Patients not explored	4

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DISCUSSION (*Abstract*)

Dr. W. W. Harper, Selma, Ala.—In every case of trauma to the abdomen one should consider whether there is a penetrating wound, such as is made by a gunshot or stab, or (2) a non-penetrating wound, such as a contusion.

In every penetrating wound a laparotomy should be done as early as possible. In every severe contusion of the abdomen the outstanding question is "Has there been a visceral rupture?"

In rupture of the spleen, kidney, and liver the symptoms of a visceral lesion are so pronounced that one has no hesitancy in doing an exploratory laparotomy; but in rupture of a hollow viscus following a blow on the abdomen there may be no shock; no increase of pulse rate; no muscle rigidity; no tenderness; and one may be in doubt of a visceral rupture.

However, there is one sign which is always present and which comes on very promptly after injury, and that is pain. The pain is constant and very severe.

I will report a case illustrating the point in hand. A man was thrown from a loaded truck, which ran over his thigh. He was immediately brought to the hospital and an examination showed a fractured femur. There was no external evidence of injury to the abdomen; the pulse rate was normal and there was no rigidity of the abdominal muscles. There was no shock nor tenderness, but the man was complaining of severe pain in his lower abdomen, which was not relieved by a hypodermic of morphine. The pain was so severe and so persistent that within three hours after the injury his abdomen was opened. Laparotomy revealed a three-inch blow-out of the descending colon. The colon wound was closed and the man made a good recovery.

Dr. F. Webb Griffith, Asheville, N. C.—A colored boy, age 12, was brought in to the hospital late one afternoon with a history that he had been struck by an automobile. The impression of a witness was that the wheel had not run over the body.

The examination was essentially negative. The abdomen was soft and without muscle spasm or tenderness. The extremities were normal and the pulse was normal. Three hours later there was a suspicion of distention and more than a suggestion of tenderness throughout the abdomen. The leucocyte count then was 12,000 with 80 per cent polymorphonuclears. The pulse was 100. We felt that there was something wrong, but could not quite make up our minds to explore. The next morning the picture had changed; the abdomen was definitely distended and markedly tender with considerable rigidity. The boy was obviously quite ill. The leucocyte count and differential were practically the same. For the first time a hemoglobin was made and shown to be 78 per cent. That, of course, gave us a clue and the hemoglobin estimation should have been done the evening before.

An incision was made and a large quantity of free blood was found in the abdomen. Immediately a gauze sponge was placed over the incision while citrate solution was being prepared. A pint of blood was then removed from the abdomen, mixed with the citrate solution and given intravenously. The source of the bleeding was found to be a laceration of the liver, which was controlled by the application of hot sponges. The abdomen was filled with salt solution and closed. Almost immediately after receiving the pint of blood the little patient rapidly improved.

This case illustrates what we all know but frequently do not follow, that is, that when there is a suspicion of an injury to the abdominal viscera and the surgeon is honestly in doubt as to whether to explore or not, it is far safer to explore, even if nothing is found.

The second noteworthy point is the almost miraculous improvement following transfusion of the patient's own blood. I believe this form of transfusion could frequently be used in ruptured ectopic pregnancy, but obviously the blood must be filtered through gauze first.

Thirdly, while the bleeding of the ruptured liver was controlled with hot applications, I believe it would have been a little safer to cauterize the area gently if there had been available some form of machine such as the Bovie or a similar one. Needless to say, too great a cauterization would cause a slough and possibly invite infection.

Dr. Turberville (closing).—Autotransfusion of blood from the abdomen in injuries is rather hazardous, as it is not always possible to determine definitely that there is not an associated perforation of a hollow viscus. Contaminated blood injected into a vein would be apt to lead to a general blood infection. I am sure that Dr. Griffith satsified himself that the blood in this case was not contaminated.

I wish to urge prompt action, that we not spend too much time in treating shock. Shock that continues over a few hours nearly always means hemorrhage or perforation and delay adds to the gravity of the situation. If Dr. Griffith's patient had had a perforation his operation would have been useless. If we operate upon cases not seriously hurt we do not kill our patients. We only inconvenience them for a short while.

TREATMENT OF FRACTURES IN CHILDREN BY THE USE OF SKELETAL TRACTION*

By W. K. West, M.D.,
Oklahoma City, Okla.

The principles to be followed in the treatment of fractures of the long bones do not change, but new methods are continually developing because of the difficulties encountered in carrying out these principles.

The femur, especially, requires traction assisted by other mechanical devices. Among the types of skeletal apparatus the Kirschner wire, or similar type of wire, in our opinion is far more efficient than either the Steinmann pin or calipers, because wire traction is practically free from infection; it is easily introduced and remains well fixed in the bone. The use of the Steinmann pin necessitates slight skin incisions which tend to invite infection. Our objection to the calipers is that the points are fixed firmly into live bone, and the restless patient moving about in bed causes a definite strain upon the steel points that results in local necrosis. Soon the pins are loose in the bone and, with motion taking place in the area about the caliper ends, the patient complains of discomfort.

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

The chief objections raised in regard to the employment of wire traction are:

(1) Possibility of infection.

(2) Pain in leg because of wire cutting through the bone and skin.

(3) In children, the danger of the wire's injuring the epiphysis. And again in fractures of children, skin traction as strongly advocated by many men such as Russell is found to be sufficiently adequate; therefore, it is unnecessary to subject a child to the danger of infection and to the danger of epiphyseal injury. In our experience, however, we have had considerable difficulty with skin traction because of extensive skin irritation from the adhesive which has markedly interfered with the carrying out of the efficient traction principle. We have had no infections from the use of wire traction, and in several cases, particularly in fractures complicated by burns, and in compound fractures complicated by severe skin abrasions that later became infected, there was apparently infection about the wire. Yet, in no case have we had any difficulty with immediate healing following removal of the wire. In spite of local infection, the wound is so small that there seems to be sufficient resistance to prevent infection of the bone tissue. There has been no injury to the epiphyseal lines; therefore, no danger of interfering with normal bone growth.

The two chief objections in the use of skeletal traction are, first, the cost of the necessary equipment, including wires, bows, wrenches, drills, Braun frames, and so on. Second, in the weight traction cases it is necessary to retain the patient in the hospital longer than in treatment by other methods. However, if the case can be treated effectively by immediate reduction of the fracture followed by introduction of the wire into bow attachment, to be included in a plaster spica, the patient may be removed home if necessary.

The type of skeletal apparatus is the Kirschner wire and Kirschner bow attachment usually introduced by the V. Mueller type of hand drill. In the femur, the wire is introduced about one-half inch above the epiphyseal line and through the center of the anterior posterior plane. Usually we attempt to reduce the fracture by hand as Campbell does and, therefore, use a general anesthetic. In cases where a general anesthetic is unnecessary we use a local anesthetic.

Our methods of supporting the leg are, first, in cases between three and twelve years of age (we use the Bryant vertical suspension method under three years) we use the double hip spica with the top of the cast on the affected leg removed. The cast is used simply as a posterior support as in the Thomas or Hodgkin's splint. We have found that the cast holds younger children in bed much better than the Braun frame or Thomas splint, and they have no discomfort or irritation about the ischium.

In fracture of the femur, the position that the leg is placed in in the cast depends upon the type and situation of the fracture. If the fracture is just below the trochanter in the upper shaft, we try to put the leg in about 30° abduction and 45° flexion at the hip, with a corresponding flexion at the knee. If the fracture is in the middle of the shaft, the leg is placed in very slight flexion. If the fracture is just above the knee we again use marked flexion.

In children over twelve we use the Braun frame, one that has been advocated by Bohler and demonstrated by him on his visit to this country two years ago. Older children may be cared for quite comfortably by the use of the Braun frame, which makes it possible to put on coaptation pads if necessary, and in the summer time is much cooler.

The wire is removed at the end of three or four weeks unless union is unusually slow. In some cases a cast is applied, the wire and bow being included in the cast, and the patient allowed to go home for three to six weeks. After the case has been removed, a walking caliper splint is applied to be worn from one to four months if necessary.

The Kirschner wire type of traction has been used on fractures of the humerus in a few cases of children. The wire is introduced through the olecranon and is supported by a pulley which is incorporated in the shoulder spica. Wire traction has been used in fractures of the forearm in children in three cases. All were fractures of several days' duration before admittance to the clinic. The results are satisfactory. We expect to continue the use of skeletal traction in these neglected or unreduced fractures. However, so far, we have found the wire unnecessary in fresh fractures.

The major indications for use of skeletal traction are:

(1) Cases that are admitted to the hospital several days or weeks following the accident.

(2) Cases in which there is serious skin in-

volvement which interferes with the application of skin traction.

(3) Cases in which there are multiple fractures such as a fractured femur and a fractured tibia and fibula in the same leg. In this type, fixed skeletal traction is indicated; that is, the fractures are reduced and the fragments fixed by the introduction of wires, and they are held in the cast by the aid of metal bows.

(4) Cases of mal-union of the femur with sufficient shortening to warrant open reduction should be followed by wire weight traction.

DISCUSSION (*Abstract*)

Dr. W. B. Carrell, Dallas, Tex.—There is nothing fundamentally wrong with skeletal traction in femur fractures of children, but in most instances skin traction is adequate. Many of us have used large pins in leg lengthening and traction before reduction of old hips, and damage to the bone or epiphysis was negligible. Small wire as used by Dr. West is better tolerated, and therefore may be safely used in the limited number of cases where skin traction is not feasible.

In our experience the Hoke traction plaster for children under 6 or 8 has been most efficient. In older children, manipulation is done on the fracture table and without change from the hip and knee flexed position a plaster spica is applied. If the fracture is more oblique a combination of traction and plaster or traction alone over Thomas or Braun splint is indicated.

Better traction can certainly be obtained with wire through the bone and I would not hesitate to use it if necessary. We have done this on 4 or 5 occasions in recent months. In three cases the wire was incorporated in plaster to fix the lower fragment and twice direct skeletal pull over an angle femur splint was used. No trouble whatever was experienced on account of the wire. The only reason we do not use it more is that we have found skin traction in children sufficient for good reduction.

Dr. Isidore Cohn, New Orleans, La.—I cannot say much in favor of putting wires through bone, particularly in children. The danger of premature ossification of epiphyses following operation must not be overlooked. I feel that doctors are prone to do too much for too little.

Dr. Barney Brooks, Nashville, Tenn.—After having been requested to discuss Dr. West's paper, I cannot do otherwise than to state my objections to the frequent use of skeletal traction for the treatment of fractures in children. Simpler and safer methods give equally satisfactory results. From my own experience, I believe that an instance of fracture during childhood in which skeletal traction is indicated will rarely be encountered.

Dr. West (closing).—Granting that it is not absolutely necessary to use skeletal traction, I still maintain that it is well to know how to make use of different methods in particular cases. Skeletal traction is used all over the country in many clinics in a great many ways.

THE PSYCHIATRIC HISTORY OF THREE FAMILIES MODIFYING HEREDITY*

By S. T. Rucker, M.D.,
Memphis, Tenn.

The influence of heredity was recognized by the ancients. Biblical history in the Ten Commandments given to Moses notes that the iniquity of the fathers was visited on the children unto the third and fourth generation. Study and experiments have been made by many investigators and statistics by various authorities have been produced in an effort to work out a uniform law of heredity without success. Mating and cross mating will bring forth deviations, recessions and reversions which confuse rather than elucidate. Again the evolution of the individual is largely influenced by environment and training.

Of course one must recognize the fact that heredity plays a tremendous part in the etiology of disease and especially diseases of the nervous system. Neuropathic and psychopathic parents transmit to their progeny a diathesis or predisposition that may later cause a child to succumb to a nervous or mental disorder when exposed to trying ordeals, emotional strain or infection. Should an individual of this type escape a nervous breakdown and mate with a normal person, the offspring may react in a normal way to ordinary stimuli and have less disposition to nervous disorders than the tainted forbear. A favorable mating of this offspring may in turn produce children near the normal type (see *Table 3*).

The psychiatric history of three families who came under my observation will illustrate three types of hereditary influence.

Case 1.—In the first generation, the father died at 34 years of malaria. The mother died at 46 of strangulated hernia. At the age of 40 the mother was treated for a mild neurosis and made a good recovery in three weeks. They had one son and two daughters. The son and youngest daughter committed suicide. The oldest daughter, who was considered a neuropath from childhood, was treated for a severe type of mental disorder at the age of 46, from which she recovered after 14 months and is now, at the age of 50, apparently well.

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*Read in Section on Neurology and Psychiatry, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

Table 1, Case 1

First Generation	Second Generation	Third Generation	Fourth Generation
Father normal	(1) Son suicide		
	(2) Daughter suicide		
Mother mild neurosis	(3) Daughter psychosis		

Case 2.—In the first generation, the father was addicted to the use of morphine. The mother was in good physical condition and free from any mental defect until the age of 69. An only sister of this healthy mother, four of her five children and three of her grandchildren were mentally or nervously affected before the mother herself died at the age of 69 of a mental disorder. (Her only sister was treated for a severe type of anxiety neurosis at the age of 53. She recovered after 6 months in a sanitarium and is now living at the age of 73 in fair health.) Of her five children, one daughter died of a mental disorder. An older son was treated for a psychosis of a depressed type for two years. He recovered and is still living. He has an only son who is a neuropath, who stays at home and has never made any effort to do anything for himself. Another son of the second generation has been treated in sanitariums and a state hospital for a mental disorder. He has some young children, but I have no report as to their mental status. Another daughter of the second generation has been treated twice for a psychosis of a severe type. She made an incomplete recovery and is able to be at home at the last report. This daughter married a man who later died of tuberculosis. They had three children, two sons and a daughter. The older son was a problem child and left home in his early teens. Some 15 years later he wrote his mother he was married. Investigation found him married to a normal woman with some business ability and they were succeeding in a small way. The other son, an erratic and emotional neuropath, when last heard from, was unmarried and making a bare living. The daughter, at the age of 16, was treated in a sanitarium for a paranoid type of schizophrenia. She recovered and a year later married a man of 40. She had two daughters before dying at the age of 23 from an acute psychomotor disorder.

The younger of these two daughters, at the age of 16, was treated for a neurosis in a sanitarium for six weeks. A year later she was again treated for the same trouble, making an incomplete recovery. She is able to be at home, but unable to keep up her studies at school. The other daughter, at the age of 17, is a psychopath of a mild manic-depressive type.*

The third daughter of the second generation in this family, the only blonde of the family, has so far escaped a mental disturbance.

*Since reading this paper the older daughter, 17, died of a psychomotor disorder.

Table 2, Case 2

First Generation	Second Generation	Third Generation	Fourth Generation
Father drug addict	(1) Son psychosis	(1) Son neurosis	
	(2) Son psychosis	(1) 2 children; no report	
	(3) Daughter psychosis		
		(1) Son problem child	
	(4) Daughter psychosis	(2) Son neurosis	
		(3) Daughter psychosis	(1) Daughter neurosis
			(2) Daughter psychosis
Mother psychosis	(5) Daughter normal		

Case 3.—After a bad start, the genealogy of this family shows a tendency to revert to the normal. The first generation, one son and two daughters, were the progeny of first cousins. One daughter was an imbecile. The son died from suicide. The other daughter, while strong physically, was a neuropath during her entire life of 84 years. At the age of 18, she married a man whose heredity for three generations back was free from any psychiatric stigma. From this marriage there were eight children. Three died in infancy. Two sons and two daughters, who lived beyond the age of 50, were free from any nervous disorder. One son has been a neuropath from childhood. Two sons and two daughters of this second generation married and all have healthy, normal children. It will be noticed that from favorable mating in this last named family the psychopathic taint of the first generation appears to have been eliminated in the third generation and their progeny reverted to the normal type.

Table 3, Case 3

First Generation	Second Generation	Third Generation	Fourth Generation
Father	(1) Son suicide		
	(2) Daughter imbecile		
	(3) Daughter neurosis (Husband normal)	1, 2, 3 died in infancy	
First cousins		(4) Son normal	Normal children
		(5) Son normal	Normal children
		(6) Son neuropath	
		(7) Daughter normal	Normal children
Mother		(8) Daughter normal	Normal children

Hereditary influence in the family of *Case 2* shows a cumulative intensity and a psychopathic transmission to the children of the fourth generation; while the family mentioned in *Case 1*

suffered a more disastrous end. Beginning with parents apparently of normal type (except for a mild transient neurosis in the mother) two of the children died from suicide. The other one suffered from a severe psychosis for more than a year and with her passing the entire family will be wiped out. In conclusion, I feel warranted in saying that the influence of heredity in psychiatry is variable and uncertain. It is still a subject for investigation and future research.

DISCUSSION (*Abstract*)

Dr. H. S. Ward, Birmingham, Ala.—When the male and female elements join each other and become a single individual, the potentialities of the future individual are all present with both parents' hereditary traits and possibilities. Any change that takes place in the individual due to outside influences is environmental and not hereditary. Any infection that may come from the mother during intra-uterine life, syphilis or other infections or traumata at birth, are environmental. The child may be a mental defective as a result of these extrinsic forces which are not chargeable to its germ plasma or familial weakness.

The first family reported in Dr. Rucker's paper, with a normal father and mildly neurotic mother, it seems to me, would belong to the type of extrinsic influences brought upon the individual at some time before birth or afterwards to bring about the completely neurotic second generation of one son and two daughters.

The second family group could easily be explained as due to the potentialities in the original germ plasma of the male and female elements. This is a case of true heredity.

The third group, beginning with two normal parents, first cousins, may have become abnormal because of disease, food, or other influences. It is difficult to imagine that true hereditary germ plasma degeneration occurred in two generations with a return to normal in the fourth, unless we figure intermarriage with normal and predominants outside the original family strain.

Dr. Pat Murphey, Little Rock, Ark.—During my short experience I have observed that mental and nervous diseases do occur as the result of mating in normal and abnormal individuals. The majority of nervous disorders have resulted in a neurosis rather than in a true mental disability. It has also been my observation that these disorders occur in the mixing of races, as in intermarriage between Jews and Gentiles. It has been discouraging to see inferior individuals come from a mating of normal parents, where there was no mental disease in either the mother or father or in the two preceding generations.

The nervous system may do its work easily and be graded as a normal system previous to adolescence. After adolescence and during the child-bearing period the nervous system of the woman may, and is apt to, fail to adapt itself to the responsibilities of the home work and of motherhood. The man is also apt to break at this same age and shirk his responsibilities. A damaged nervous system usually ends in a neurosis or a psychosis.

Dr. Lawrence F. Woolley, Towson, Md.—In studies made at Towson, Maryland, it was found that the number of abnormal individuals in the ancestry of a group of mental patients was no greater than in the ancestry of a similar number of normal people. Several such studies are on record, notable among them the one made at Craig Colony, in which a similar finding was discovered for epilepsy: there was no greater incidence of abnormal individuals in the ancestry of a group of epileptics than in the ancestry of an equal number of normal individuals. These studies emphasize the need for careful control of our studies of heredity, since individual case studies may be very misleading. Dr. Partlow, I believe, stressed the inheritance of physical factors as an argument for the inheritance of behavior patterns; but even the inheritance of characteristics like blue eyes and blond hair may not be so simple a proposition as one might imagine. There are certain flies which hatch with wings if incubated under certain circumstances, whereas they hatch without wings when incubated under different circumstances. One is tempted to ask whether it is heredity for the fly to have wings or not to have wings.

Dr. Rucker (closing).—My conception of hereditary influence is that a disease entity is not transmitted to children; but instead a predisposition, or biological tendency, which renders one more susceptible and liable to certain diseases that one's parents were afflicted with. Along with this hereditary bias, nature has made a wise provision towards restoring the normal type, through subsequent mating and ceasing to perpetuate defective species.

PELLAGRA: A REVIEW OF RECENT LITERATURE*

By G. A. WHEELER, M.D.,†
Washington, D. C.

That pellagra is caused by a specific dietary fault has been proven by an assorted mass of direct experimental evidence which may be regarded as a standard of quality in scientific medicine. No reasonable and logical questions have gone unanswered and no information relating to the disease has ever been presented which, on the basis of facts, is not in harmony with this conclusion. It is true that the exact and precise nature of the ultimate mechanism by which a missing food factor brings about this definite clinical syndrome, or how such a factor by its presence prevents it, has not yet been fully worked out. This, however, is no argument against the fact that it does. In this respect, the etiology of pellagra is in about the same situation as that of the other well known dietary deficiency diseases such as beri beri, rickets and scurvy.

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†Surgeon, United States Public Health Service.

Regardless of the enduring soundness of the modern information relating to the etiology, prevention and treatment of pellagra, and the means of relief of human misery and debility it carries, contributions to the literature in opposition to it continue to appear. It may, however, be stated that both their number and importance have rapidly decreased during recent years.

Such contributions have consisted of various and sundry poorly supported observations and opinions which, taken as a whole, are no more consistent and no less paradoxical than the older literature on the disease which is notoriously contradictory and chaotic. Many of them are so lacking in support that they are not apt to be taken seriously and may be trusted to succumb to their own weakness. There are others, however, which come from high places in modern medical thought and may appear, to the less informed regarding pellagra, to rest upon a sounder basis. These, too, might well be left to their own merits were it not for the possibility that some of them may, in certain sections, lead to temporary confusion and hesitation in our efforts against one of the South's major public health scourges.

In spite of what we know about its treatment and prevention, pellagra is still a most serious problem in many sections of the South. Its incidence is inseparably bound up with the economic conditions, agricultural practices and dietary habits and customs peculiar to the cotton belt, which are hard to alter. Its control, therefore, demands clear understanding and concerted effort on the part of all concerned. Our insane asylums, orphanages and like institutions, whose diet is under central control and may be easily regulated, have gotten the upper hand of the situation. But, except for the beneficial effects of the boll weevil and the recent, and perhaps only temporary, expansion in food production because of the continued unprofitable price of cotton, the rural population, normally the largest source of the disease, has experienced very little permanent relief.

In presenting this review I am forced to disagree with many of the opinions expressed, but in so doing I do not want to appear to speak disparagingly of the efforts of anyone to throw additional light on any phase of the pellagra problem. Nor is it intended to stage a defense of the modern conception of the disease as worked out by Goldberger and his associates, which needs no defense. Though unavoidably critical in nature, the intents and purposes of this analysis are believed to be of a highly constructive nature and a contribution to the interest and welfare of the pellagrins themselves.

TREATMENT WITH ARSPHENAMINE

Wilson[1] reports the results of his treatment of pellagra with arsphenamine, which, in his opinion, justifies the belief that this drug has a distinct curative action. This observation, if sound, would imply that some micro-organism subject to destruction by arsenic may be concerned.

His cases were treated at the Jacksonville, Florida, City Dispensary and the Out-Patient Department of the Duval County, Florida, Hospital. In all, more than 200 cases were treated, but only 100 (2 of which are regarded as controls) are used in his analysis. He emphasizes the fact that only ambulant patients were treated by this method, the more advanced being sent to the hospital. This selection of the milder cases is held by him "to account in a large measure" for the "very low" rate of mortality associated with the arsphenamine treatment. In his description of the symptomatology it is stated that "the patient has a characteristic anxious expression around the eyes, which is so marked that a diagnosis can often be made by this symptom when others are indefinite." Whether this criterion was used as the basis for the diagnosis of any of the cases considered in his report is, unfortunately, not stated. The routine custom was "to begin at once the weekly administration of arsphenamine, also giving tonics to be taken by mouth and oral instructions as to diet and care." Arsphenamine, neoarsphenamine, and sulpharsphenamine were used at different times, "the end-results being equally satisfactory with each."

In presenting his findings, the author states that he "does not wish to discourage the general method of treatment" and regards "a high protein diet, tonics and a change of hygienic surroundings" as of "the greatest importance not only for the cure, but for the prevention of recurrence." He further states: "In our cases we prescribed a diet which in most cases our patients were unable to obtain, and we have usually found that for one reason or another our instructions have been very poorly carried out, and in a great majority of cases very poor effort has been made toward raising their standard of living." Definite information regarding the actual dietary of any individual patient while under treatment with arsphenamine is lacking. However, the following illustrations are cited as clinching the proof "that the arsphenamine was responsible for most of the improvement:"

A family of ten, all pellagrins, were treated with arsphenamine. The father had the mildest case of any, but the children were not too sick to continue in school. The mother and children each received three doses of arsphenamine at weekly intervals, the father only one. The family was under the care of the Welfare Board during this time, being furnished "fresh meat and milk daily and all other foods kept replenished as they were used." At the end of three weeks the mother and children were all improved and in two months they were apparently restored to health. The father was not seen after the first visit until the family was leaving the State about three months later. At this time he showed little, if any, change.

The father, though apparently included as one of the series treated with arsphenamine, is also considered a control. His symptoms must have been extremely mild, since he was less involved than the children, who, themselves, were apparently very mildly affected. He had also received one dose of arsphenamine, which in three other cases of the series reported appeared to bring about improvement. Furthermore, he is reported to have been "always absent from home" after the first visit and, presumably, out of touch with the good diet furnished the other members of this household by the Welfare Board during the period they were receiving the arsphenamine.

The second illustration involves two cases in which arsphenamine was not used and which are therefore looked upon as general controls. One was a small boy of the same neighborhood as the above family, though not under the care of the Welfare Board, who "claimed" to have carried out the dietary instructions, but had shown no appreciable change. Since the author states that as a rule the patients comprising this group "are ignorant and poverty-stricken, and are unable or unwilling to change their mode of living," what the results might have been had this child also been provided suitable food by the Welfare Board is apparently not taken into account.

The other control was a man 77 years old who is described as having had pronounced mental symptoms, and who died within four months. He refused the arsphenamine treatment, but whether he was equally antagonistic toward the changes in diet suggested is not stated. His wife, also a pellagrin, was given six doses of arsphenamine and recovered. It is stated that "although she prepared the food and attempted to carry out the dietary instructions, it was very poorly done," and, in the opinion of the author, "could not have had much to do with her improvement."

The attempt to draw conclusions from observations of the above nature is extremely hazardous. Whether people under restricted conditions, or even in easier circumstances, do or do not carry out dietary instructions to a sufficient degree to control pellagra is a gap too wide to be safely bridged by mere assumptions. Other observers have been equally misled. The majority, however, have tended to discredit the value of diet on the basis of the opposing assumption that their instructions as to food had been adequately carried out simply because such advice had been correctly given.

Dr. Wilson is, in all probability, correct in assuming that his patients as a group fell short of carrying out his dietary instructions. This, as well as the fact that the administration of arsphenamine was without effect, is indicated by the death rate in his series, which is nearly twice as high as was found in an intensive survey of endemic pellagra in a neighboring state, which included 1,147 definitely marked cases of all grades of severity and complications. The majority of these received no treatment other than nature's addition of certain foods and foodstuffs which became available as the growing season advanced. None received arsphenamine, and very few received drugs of any kind. In this country at least 80 to 90 per cent of the cases of pellagra have their onset within the period April to July, and in most of these the symptoms spontaneously disappear by August.[2] Definitely diagnosable cases of pellagra are about as rare during the period August to March as they are plentiful in May and June. It therefore follows that any method of treatment which coincides with nature's provisions for a greater assortment of foodstuffs, whether or not special dietary instructions are given, is almost certain to make a good showing, regardless of the kind of drug employed. This in all probability is the true explanation of the apparent success of drugs of various kinds in the treatment of pellagra.

Of interest in this connection is Cranston's[3] experience with the same type of drug used by Wilson. In summing up his observations in two series of cases on a fixed institutional ration this author comments as follows:

"The treatment of pellagra has demonstrated only the absolute futility of the drugs used. We constantly hear of some specific, which, on fair trial in the hands of those in a position to pass on the remedy, proves to be an utter failure. Too many spontaneous cures are accredited to the use of drugs. . . . . The only constant factor in the use of salvarsan is the expense."

IRON DEFICIENCY THEORY

Bliss,[4] while tacitly endorsing the dietary deficiency origin of pellagra, expresses the belief that iron is the deficient factor in the various experimental pellagra-producing diets used by Goldberger and others. Contrary to the usual custom, this author chose to publish his conclusions in advance of a detailed account of the studies on which they are based. He does, however, present a review of some of the more recent literature on pellagra and promises "to publish elsewhere" the details of his study in a number of cases of human pellagra and in a series of dogs with blacktongue, which he states "are being repeated, extended, and amplified and will be reported in due course." Though nearly two years have passed, it appears that we are still without the advantage of this fundamental and essential information.

It is not desired to enter into a discussion, in this connection, of the specific nature of the accessory food factor concerned in pellagra. However, the apparent logic of Bliss' view, its publication in *Science*,[4] and its favorable mention in the editorial columns of the *Journal of the American Medical Association*[5] call for a fair evalua-

tion of the evidence cited in its support, if misguided confidence in iron therapy in pellagra is to be forestalled.

Since Dr. Bliss has not made available sufficient working details of his own observations, a consideration of his appraisal of the work of others will have to suffice. And since he draws largely upon the published reports of Goldberger and his associates in his attempt to find support for his theory, comment will be limited to his interpretation of their findings. The following is presented as the keystone of his argument in favor of his iron deficiency hypothesis:

"Goldberger and his associates adopted the working hypothesis that blacktongue of dogs is the analogue of pellagra in man, and they found that diets which are effective in preventing pellagra in man are also effective in preventing blacktongue of dogs, and the same is said of the curative effects of those diets. Examination of the protocols published by Goldberger reveals the fact that those diets which prevented or cured blacktongue in dogs are just those to which had been added 'syrup iodid of iron U.S.P.,' and those diets which when fed to dogs produced blacktongue or failed to cure the disease are those to which no iron had been added. Apparently the iron was not added to or withheld from those diets with any intent to affect the balance of the element, because the footnote explains that it was added to 'improve the mineral composition of the diet.' They make no further mention of iron."

The foregoing can be dismissed as erroneous and misleading. At no time was syrup iodide of iron used by Goldberger or his associates in their work in dogs, and no mention is made of it in any of their reports on blacktongue. It is, however, only fair to state that the pellagra producing basal diet used in the human studies at Milledgeville, Georgia, contained this substance. It was a constant basic factor in all experimental diets, regardless of whether pellagra was or was not prevented.

This author also draws on the reports dealing with the pellagra and blacktongue preventive value of the individual foods and cites the fact that while beef, liver and yeast have been found to rate high in this respect, they are also rich in iron. However, he makes the mistake of including egg yolk in this group. Although very rich in iron, this substance made such a poor showing as a blacktongue preventive[6] that its test in human pellagra was not considered worth while. He also seems to have overlooked the fact that while yeast itself was found to be rich in the pellagra preventive, its watery extract was equally good[7] and its charred form, which retains all of the iron, showed no preventive potency whatever.[8] It would, therefore, seem that in shaping his iron deficiency hypothesis, Dr. Bliss either overlooked the nullifying nature of the very facts by which he attempted to support it or failed to grasp their significance.

INFECTION OR INTOXICATION

In reporting his observations on pellagra in Nyasaland, Shelley[9] concludes as follows:

"Diet does not appear to be of any great importance in the production of the disease. The possibility still remains that the condition is due to a microbic infection or to an intoxication."

This conclusion appears to be based chiefly on the observation that the incidence of pellagra in Central Prison has been very variable, though, except for some "improvements" in 1914, 1921 and 1926, the prison dietary has shown no variation. He states, however, that during the period 1916 to 1921 no cases of the disease were reported as occurring in the prison. He adds that this does not mean that cases did not actually occur, for during that period frequent changes were made in the prison medical staff, and it is possible that the new medical officers were unfamiliar with the condition.

The prison menu which he describes consists of maize, rice, "meat," peas or beans, and "vegetables." The sum total of the improvements reported to have been made from time to time since 1914 amounts to an increase in the maize by 1½ pounds per week, a reduction of the rice by 3 pounds per week, and an increase in the "meat" and "vegetables" by 1 pound each per week.

From Shelley's description of the above diet it is to be regarded as a fixed affair, since he makes no reference to permissible substitutes or switching among the various constituents, nor to any extraneous variables occasioned by seasonal, economic or other influences which may be reflected in the dietary of this prison. The reader must therefore regard the dietary described as limited at all times to the items set forth in the menus presented and in their respective proportions.

The above, however, is not in agreement with a description of the dietary of this prison by Leitch, a contemporary and compatriot of Shelley. On the authority of the Director of Medical and Sanitary Services of Nyasaland, this author describes[10] two menus, a "long sentence" and a "short sentence" dietary as prevailing in Central Prison. Both of these diets are essentially different from that described by Shelley and permit of rather wide and important variations from time to time. From Leitch's description, fish instead of meat appears to be the staple animal food in use, but in the "long sentence" dietary the weekly allowance of 2 pounds of fish may be replaced by 1 pound of meat. In the "short sentence" ration

the fish is interchangeable with peas, beans, or "other pulses." This is in contrast to the weekly menu described by Shelley in that he mentions but one menu and includes 2 pounds of meat, making no reference to fish. Leitch lists both maize and millet meal, which are interchangeable with each other, and either or both of which may be replaced by rice on the basis of 1 pound of rice for each 1½ pounds of meal, while Shelley includes only maize meal, and makes no reference to permissible substitutes. Shelley's description also places peas or beans as fixed items, while Leitch states that these articles may be replaced by an equal quantity of ground nuts, and that "fruits, when available, may be given as an extra." This author also adds that

"Little or nothing is known of the vitamin content of diets in this country. In the prisons, fresh vegetables and fruits (mangoes, pawpaw, etc.) are given according to the season, with the object of providing vitamins."

In view of the wide discrepancy in the description of the dietary of this prison by these two observers and the general terms used by both, it is impossible properly to pass upon the merits of Shelley's contention. On the surface, it would appear that, while subject to more or less variation, the dietary of this prison has, at best, a low margin of safety against pellagra. Under such conditions a seemingly unimportant variation may appreciably influence pellagra incidence. If, for example, the fish should be replaced by peas or beans, which, according to Leitch, is permissible, the "short sentence" ration would become decidedly pellagra-producing. Furthermore, since some vegetables are fairly high in the pellagra preventive and others quite low, the general term "vegetables" is too vague and indefinite for use in determining the finer pellagra-preventive properties of diets in which such items form a considerable but variable proportion.

ETIOLOGY AND PATHOLOGY

Thatcher,[11] in presenting a review of the etiology and pathologic anatomy of pellagra, questions its specific relationship to diet and devotes considerable space to some of the older and, for the most part, long dormant theories at the expense of the unchallenged results of the more modern researches. For example, he does not seem to think very much of the repeated experimental production, cure, and prevention of pellagra in the human subject, but, on the other hand, appears to take kindly to what he regards as "an important contribution" made by Harris on the basis of his study in the monkey. This was contributed nearly 20 years ago, and subsequent investigations, including those of Harris himself, never have been able to confirm it.

Since nothing new is presented by this author, and all that he cites has already been duly examined and carefully weighed by most students of pellagra, further comment seems unnecessary. It is, however, desired to call attention to an error which might be construed as an unwarranted reflection on the quality of Goldberger's work. Dr. Thatcher states:

"Aykrod and Roscoe found that dried ox liver, yeast and fresh whole milk were excellent sources of vitamin B_2. Since meat, milk and especially yeast were important articles required for prevention or cure, it was natural to relate vitamin G as the necessary pellagra-preventing factor. Vitamin G caused pellagra-like symptoms in the albino rat to disappear and this vitamin was then designated as the antipellagric vitamin. *Goldberger now changed his opinion to comply with the vitamin G deficiency theory.*" (Italics are my own.)

Those who have kept up with the rapid progress in nutrition in general, and pellagra in particular, need not be reminded of the erroneousness of the foregoing statement. For the sake of others, it might be stated that it was through Goldberger's pioneer work on the etiology of pellagra that the complex nature of vitamin B was recognized and separated into its present components. It is, therefore, neither correct nor fair to accuse Goldberger of changing his opinion to conform to this newer knowledge which, itself, was the very outgrowth of his own investigations and completely in line with his hypothesis.

"DOPA" THEORY AND SODIUM THIOSULPHATE TREATMENT

Under the title "On the Chemical Nature of the Pellagra Toxin and the Discovery of the Sodium Thiosulphate Treatment of Pellagra," Sabry[12] claims that a daily dosage of 10 c. c. of a 10 per cent solution of sodium thiosulphate intravenously brought about a cure, or a marked degree of improvement, in a series of 24 cases of pellagra treated at the Alexandria government hospital, Alexandria, Egypt. On the basis of this observation, the author formulated what he terms the "dopa theory" of the origin of pellagra, claiming that the "dopa," or "pellagra toxin," may occur in maize or other cereals, but more specifically in beans.

It appears that the sodium thiosulphate treatment was begun upon the admission of the patients to the hospital, but no information regarding the nature of the diet, while being so treated, was furnished in his original report.

However, in a later issue (vol. 34, No. 24) of the same publication the following diets are given as having been used concurrently with the sodium thiosulphate treatment:

Full Diet.—Containing, among other things, milk, beef, beans and "vegetables."

Milk Diet.—Consisting chiefly of "native bread," milk, veal, rice and sugar.

Fever Diet.—Composed of milk and veal.

Pellagra Diet.—Consisting of "native bread," "vegetables," rice and a "half chicken."

Of the series of 24 patients upon which Dr. Sabry claims to have demonstrated the therapeutic value of sodium thiosulphate and on which his "dopa theory" is founded, 11 received the "milk diet," 2 the "fever diet" followed by the "milk diet," 1 the "full diet," 1 the "full diet" followed by the "milk diet," and 9 the "pellagra diet."

With this dietary information available, comment seems almost superfluous. For the most part, these rations represent all that could be desired in the treatment of the average case of pellagra and, under their use alone, relief from symptoms may be confidently expected well within the period of time covered by the sodium thiosulphate treatment. Since the diets described were used simultaneously with the injections of sodium thiosulphate, the logical conclusion, if a conclusion may be regarded permissible from observations of this character, would seem to be that an adequate diet will bring about recovery from pellagra in spite of the daily intravenous administration of 10 c. c. of a 10 per cent solution of sodium thiosulphate.

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DISCUSSION (*Abstract*)

Dr. Jethra Hancock, Louisville, Ky.—Dr. Wheeler's investigations of pellagra, as you all know, have extended over a period of many years. Dr. Wheeler was privileged to be intimately associated with Dr. Goldberger at the very beginning of his research into this subject. Indeed, he worked hand in hand with Dr. Goldberger up to the latter's untimely death and has since ably carried on. In reviewing the literature of the past eighteen or twenty years, one is impressed with the various conflicting theories advanced, many of them far fetched and irrational, until Dr. Goldberger was assigned by the U. S. Public Health Service to make a study of pellagra in the Southern states. Under his direction and guidance ample evidence was accumulated to show quite conclusively that pellagra is definitely a deficiency disease, just as much so as scurvy, beri-beri or rickets. The findings of Drs. Goldberger and Wheeler seem to me to be sufficiently conclusive to establish this viewpoint as a scientific fact in the mind of anyone taking the pains to examine their work. They have been able both to produce the disease by withholding certain specific articles of diet and to cure those already afflicted with the disease by instituting appropriate anti-pellagra diet. They have carried forward this procedure with careful controls, over and over again.

While I make no pretense of having any expert knowledge of pellagra, I have been privileged in the last three or four years to see scores of cases in southeastern Kentucky, many of them in company with Dr. Wheeler. Something like 4,000 cases have been reported in Kentucky. Two thousand of them are to be found in restricted areas in three counties, Bell, Knox and Whitley, in the southeastern section of the State. Some three or four years ago I was quite skeptical of there being such a high incidence of this malady in these particular regions, in comparison with other sections of the Commonwealth. I thought, knowing as I do that the rate of syphilis is relatively high in the industrial areas of these counties, that many of the cases reported might be confused with cutaneous manifestations of syphilis, ivy poison and other skin lesions not associated with pellagra. However, on investigation I convinced myself that this was not the fact. My first investigation was in the fall of the year and I was informed by the local health officers and other physicians that the symptoms were very much subsided at that season in comparison with those obtaining in the spring and early summer. I visited the same region the following spring with Dr. Wheeler, after previously arranging to have the suspected cases of pellagra brought into the county seat for his observation. He confirmed the fact that there was a very high incidence of pellagra.

The State Board of Health of Kentucky is fortunate in having a very competent all-time health officer in each of the above mentioned counties. These health officers have become very much interested in gathering together the known and suspected cases of pellagra for clinical observation and recording of findings. The clinics are large and the data concerning the respective cases intelligently compiled. In practically every case where the source and quality of the diet can be analyzed, the evidence supports the conclusion that there is a deficiency in that regard, and that they have, for many months or years, been subsisting on a pellagra producing diet. On the other hand, where proper articles of diet can be made available to supply these deficiencies under the direction of the health officers, there is a dramatic and uniform improvement in the pellagra tendency.

Coal mining is the chief industry in all of the counties referred to. One very interesting observation is

that there are comparatively few cases of pellagra in these communities where food supplies are drawn from the commissaries of the large mining corporations, which carry ample and diversified stocks. On the other hand, the majority of cases of pellagra are traceable to those smaller mines which give only part-time employment and carry meager commissary supplies. This is cumulative evidence that, where there are ample and well chosen food supplies with all-year employment, pellagra is not a problem, even in the same or adjoining communities.

In all of these industrial counties, there is a splendidly equipped and unusually well-informed medical profession. This prevails in consequence of the fact that this rapidly developing industrial area attracted many young physicians during the peak of coal mining expansion. Many of the physicians in the local communities have entertained, during the last twenty years, divers and sundry opinions as to the causative factors of pellagra and its appropriate treatment. All of them have observed that it is a seasonal disease, evidencing acute manifestations in the early spring and summer, gradually subsiding during the fall and early winter. This further corroborates the findings of Dr. Goldberger that it increases and subsides with seed time and harvest. While observations have been rather uniform on this point, there has been great local diversity of opinion as to the remedial agents that are useful in the treatment of the disease, each one generally holding to his own favorite remedy or remedies. Only a glance is required to see that very competent observers may be misled, when we consider that any agent used in the spring of the year, at which time the afflicted patient usually seeks medical advice because of the severity of symptoms, apparently produces results, coincidentally with the appearance of the first garden vegetables that help to supply the dietetic deficiencies. This further clinches the modern conception that pellagra is a deficiency disease.

Many physicians in this area have long been interested in pellagra and have written very creditable articles, setting forth their individual theories and conceptions of the causative factors of this disease. Yet, within the past four or five years, chiefly because of the influence of Dr. Wheeler, the majority of doctors in these counties have, I believe, come to accept the Goldberger theory as a proven scientific fact, and are devoting themselves to the teaching of the dietetic deficiency as the causative factor in pellagra. At least, one of the health officers in this area has done some very notable work in organizing garden and fresh meat clubs and in inducing the more prosperous people to give the loan of cows in his community where pellagra is very prevalent.

Accepting this modern scientific viewpoint, which has been proven beyond a rational doubt, it behooves all public health workers to cooperate with farm agents, civic and educational groups and other groups in disseminating the proper understanding of the importance of a well-balanced diet in the prevention and relief of pellagra.

Dr. Wheeler (*closing*).—Just a word in reference to the present trend in food production and pellagra incidence. It is generally believed that pellagra is associated with poverty, being more prevalent during hard times and less so during periods of prosperity. By and large this is the case. However, hard times or prolonged depression can influence pellagra incidence only through influencing the nature of the diet. Under some conditions of economic distress agricultural prices may be so involved as to give some elements of population a poorer diet, while others may have a greater variety of food than before. About 98 per cent of all the pellagra in this country occurs in those states in which the production of cotton is the principal agricultural pursuit. The food availability conditions, method of rationing, and the dietary customs and habits of the rural cotton belt are normally more favorable for the production of pellagra than in any other section of the country. But, judging from reports from various sections of the South, the continued low price of cotton has brought about important favorable changes in food conditions. The small, or tenant, cotton farmer appears to be producing more and a greater variety of food at home and depending less on the planters' commissary or the country store. To the extent that this practice prevails the more adequate will be the protection against pellagra in these sections and the less pellagra there will be, regardless of the extent or duration of the depression.

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Seventh Annual Meeting
RICHMOND, VIRGINIA, November 14-17, and a post-meeting day in Washington, D. C., November 18

RICHMOND IN NOVEMBER

Historic Richmond in historic Virginia will entertain the Southern Medical Association in November, the Richmond Academy of Medicine being the host of the occasion. Not since 1914, just after the World War began, has the Association been privileged to meet in the capital of the Confederacy.

Virginia is the earliest settled and earliest civilized part of America. It contains the oldest colony in America which was settled by English-speaking people. Of the first five presidents of the United States, four, Washington, Jefferson, Madison and Monroe, were Virginians. The story is familiar of the small boy in Virginia a generation or so ago who was severely chided by his father; he had asked a guest in the house where he came from. "Don't you know, my son," said his father, "that if he is a Virginian he will tell you himself. If he is not a Virginian you must not embarrass him by bringing the question up."

The history of Virginia from the first settlement of Jamestown in 1607 to the present is the history of the nation. The first representative assembly of the new country met in Jamestown in 1619, before the landing of the Pilgrim Fathers at Plymouth. "On her soil the Revolution ended with the surrender of Cornwallis at Yorktown, and the Union was forever cemented when the gallant army of Lee laid down its arms at Appomattox."

In the early days before the American Revolution, the fervent words are attributed to the Virginia Colonial Governor, Sir William Berkeley, "I thank God there are no free schools nor printing here, and I hope we shall have none these hundred years." This spirit has wholly changed in Virginia as elsewhere in America, and the public school system, the colleges and institutions of higher learning in Virginia have excelled those of many sister states in the Union. Virginia contains two state supported medical colleges of highest academic standing, that of the University of Virginia, at Charlottesville, and the Medical College of Virginia, in Richmond itself.

The Richmond Academy of Medicine has recently fallen heir to one of the finest medical historical libraries in the world, that of Dr. Joseph L. Miller, an alumnus of the Medical College of Virginia. The new home of the Academy housing the library will be open to visitors to the meeting, and for physicians of culture it is easily worth the trip to Richmond to see this remarkable collection of volumes, manuscripts, prints, autographed letters, engravings, silhouettes and relics of former centuries.

In this issue of the JOURNAL on page 659 will be found the first of a series of articles on Richmond, past and present.

PROGRAM PLANS

Scientific progress has been speeded rather than slowed down by the world economic depression, and it is probable that more advances in clinical technic have been made in the past few years than at any other period in medical history. A very large part of these, it may be said without narrow patriotism, have been developed in America. By a meeting of a considerable group of men of all specialties, such as are represented in the Southern Medical Association, new methods may be studied and evaluated; and as always among Southerners, the good hand of fellowship will be extended to make pleasant the difficult task of mastering technical knowledge.

The program of the twenty-seventh meeting of the Association will be like that of other meetings in the order of procedure. There will be a general clinical session provided by the physicians of Richmond on Tuesday, November

14. On Wednesday the general clinics arranged by the President of the Southern Medical Association, Dr. Irvin Abell, of Louisville, will be conducted by men from north and south of the Mason and Dixon line. Several of the sixteen special scientific sessions and four conjoint meetings will run concurrently with the general session on Wednesday. Thursday and Friday will be given over wholly to sections and conjoint meetings. Meeting conjointly with the Southern Medical Association again are the American Society of Tropical Medicine, the National Malaria Committee, the Southern Branch of the American Public Health Association, and the Southern Section of the Society for Experimental Biology and Medicine. A complete roster of the officers of the Southern Medical Association, general and of the sections, of organizations meeting with it, and the Richmond Academy of Medicine, is given on page 663 of this issue.

AFTER RICHMOND, WASHINGTON

The Council of the Association has approved a post-meeting day in Washington, the Nation's capital, Saturday, November 18, following the close of the Richmond meeting on Friday afternoon. An attractive medical and social program is being arranged for the Washington day. The first of a series of articles on Washington will be found on page 661 of this issue.

No one should attempt to travel abroad, to Canada, to remote sections of the United States, who does not know Virginia. The Southern Medical meeting offers the opportunity to visit one of the most charming, beautiful and oldest of Southern cities, with a welcome from congenial professional associates.

On the calendar of important events to come, mark the most important, the approaching Southern Medical meeting in Richmond, November 14-17, with the post-meeting day in Washington, November 18.

MEASLES PROPHYLAXIS

To the present time there is no specific treatment or preventive of the common epidemic diseases of childhood, except the use of specific bacterial products such as diphtheria toxoid for prevention, or immune sera for prevention and for early treatment after exposure to infection. Antiseptics and non-specific resistance building agents do not favorably affect the course of measles, diphtheria, scarlet fever or infantile paralysis, for example. The great proportion of cases of measles probably go untreated because of the difficulty of obtaining protective sera. An attack of any of these confers a lasting immunity; and there is a class of individuals which has an almost complete temporary natural immunity. The majority of infants under five or six months of age are immune specifically to measles, scarlet fever, diphtheria, and poliomyelitis, according to McKhann and Chu,[1] of Harvard.

This is demonstrated, first, clinically by their failure to contract these diseases after exposure; and second, in the laboratory by various immunological technics. It has been suggested that umbilical cord blood, or possibly the placenta, is a source of immune bodies. Infants give a negative Dick test, and scarlet fever rashes are blanched by serum from the placenta. The neutralization of poliomyelitic virus by blood from the umbilical cord has been demonstrated, and cord blood likewise contains antibodies for diphtheria toxin. Three maladies, scarlet fever, infantile paralysis and diphtheria, which are serious and frequently fatal to older children, and measles, a milder plague of childhood, do not attack such a perishable commodity as the newborn infant. The infant is susceptible, however, to other contagious diseases. He has no demonstrable immunity to smallpox, chickenpox, pertussis or infection with pyogenic organisms.[1]

McKhann and Chu attempted to extract from the human placenta substances which might give to older children some of the infant's immunity to these particular contagious diseases. They prepared a purified saline extract of the placenta, which contained no sex hormones. This is important since the placenta is a good source of several hormones. Their extract neutralized diphtheria toxin, blanched scarlet fever rashes and after incubation with poliomyelitic virus neutralized it so that it was non-infective to animals. The activity of the extract in preventing measles in a series of about 38 children who had been intimately exposed to the infection was also studied.[2] Better protection was reported with placental extract than following the use of injections of adult whole blood. Measles, they say, was prevented or attenuated in every child who received their placental injections. This would seem to be, then, another endocrine of clinical value, a single prepa-

1. McKhann, Charles F.; and Chu, Fu Tang: Antibodies in Placental Extracts. Jour. Infec. Dis., 52:268, March, 1933.

2. Idem. Use of Placental Extract in Prevention and Modification of Measles. Amer. Jour. Dis. Child., 45:475, March, 1933.

ration which has a specific effect in increasing the resistance to four different microbic diseases. *In vivo* tests indicate its value in measles. *In vitro* tests suggest a possible value in three other conditions.

If the work is confirmed, the human placenta, which has long been a waste product of deliveries, will increase considerably in value and importance. The habit of many species of animals of eating the afterbirth is to be recalled. The studies are of considerable significance from a clinical and immunological viewpoint.

GLEANINGS FROM RECENT JOURNALS

Etiology of Fibroids.—Witherspoon,[1] of Tulane University, reviews the recent literature dealing with uterine hyperplasia and fibroid formation, and analyzes a series of cases with operative findings. It is suggested that fibroid tumors of the uterus develop as follows: the ovarian follicle, instead of rupturing, persists, becomes cystic, and secretes estrin continuously while the supply of corpus luteum secretion is inadequate. Estrin, which is known to cause endometrial hyperplasia, probably also stimulates the underlying layer of uterine tissue, the myometrium, with resulting formation of fibroid growths. Fibroids are extremely common in the negro race. Statistics of Charity Hospital, New Orleans, where the annual admission of white and colored patients is about equal, show that fibromyomata are nine times as frequent in colored women as in whites. Witherspoon suggests that possibly the condition which causes fibroids, the persistent follicle cysts, is itself brought about by injury from chronic pelvic inflammatory disease which is very common in negro patients.

It is possible also, if excess estrin is a factor in fibroid formation, that a normal racial increased secretion of estrin, rather than a pathological increase, might explain the greater susceptibility of negroes.

Witherspoon suggests that prophylactic treatment of fibroids might be accomplished by injections of anterior pituitary luteinizing hormone.

It is probable that a great many clinical failures will be observed with ovarian and pituitary injections for a great many different diseases of the genital tract before the real field of these new therapeutic agents can be delineated.

Diagnosis of Suprarenal Deficiency.—For the diagnosis of thyroid disease the basal metabolic rate is a good and usually an accurate indicator. For parathyroid disease blood calcium determinations give an objective test. In the recognition of diabetes mellitus, the sugar of blood and urine give satisfactory and conclusive information, and blood sugar determinations in animals are used to standardize insulin. For ovarian, pituitary and suprarenal disorders, the active extracts are now available for treatment, but the methods of diagnosis are much less clearcut. The potency of a suprarenal cortical extract must be tested by injecting it into a suprarenalectomized animal and waiting to see whether he survives or dies. Recent studies suggest changes in the water metabolism and sodium metabolism in suprarenal deficiency, which possibly may make the diagnosis of this disorder and testing of extracts a more mathematical procedure.

In rats which die of suprarenal insufficiency, according to Silvette and Britton,[2] of the University of Virginia, the water content of the tissues is higher than that of normal animals. The suprarenalectomized rats appear to have difficulty in excreting water; they are waterlogged. The hepatic and muscle tissues are hydrated, the blood and kidneys dehydrated. As soon as an active extract is given, water is excreted again. Another change consists in the loss of sodium through the kidneys. The sodium content of patients with Addison's disease, as of experimental dogs and cats, is greatly reduced.[3] Large quantities of sodium chloride are advised in treating these patients. Robert Loeb,[3] of New York, describes a patient with Addison's disease who was followed for six months during feeding and withdrawal of sodium chloride, with no other treatment. The importance of ordinary salt in these cases has been emphasized by several workers. Loeb's patient at times received as much as 15 grams of sodium chloride a day. The clinical condition improved and declined, he says, with the rise and fall of the sodium level in the blood, and with the quantity of sodium ingested.

Sodium is not determined in routine blood examinations, not because its importance has

1. Witherspoon, J. Thornwell: The Interrelationship Between Ovarian Follicle Cysts, Hyperplasia of the Endometrium, and Fibromyomata. A Possible Etiology of Uterine Fibroids. Surg., Gyn. & Obst., 56:1026, June, 1933.

2. Silvette, H.; and Britton, S. W.: Effects of Adrenalectomy and Corticoadrenal Extract on Renal Excretion and Tissue Fluids. Amer. Jour. Physiol., 104:399, 1933.

3. Loeb, R. F.: Sodium Chloride in the Treatment of a Patient with Addison's Disease. Proc. Soc. Exper. Biol. & Med., 30:808, March, 1933.

ever been doubted, but because rapid and convenient methods of estimation have not been available.

The desideratum for Addison's disease being a blood chemical test to establish the diagnosis early, these studies on water metabolism and sodium metabolism in suprarenal deficiency point a direction of inquiry which will doubtless be followed further.

A New Form of Tetany.—The tetany of calcium deficiency, with low blood calcium, is well known. Kruse, Orent and McCollum,[1] of Johns Hopkins, have studied a similar convulsive condition in animals which results from deficiency of the diet in magnesium. It is accompanied by loss of weight and changes in the blood lipids which evidence a failing fat metabolism. It is believed to occur clinically as well. By definition, the Hopkins workers say, all forms of tetany exhibit hyperirritability and tonic-clonic convulsions, which are producible by several means. The term should not be used in the narrow sense which pediatricians frequently employ, referring merely to the low calcium type.

TWENTY-FIVE YEARS AGO

FROM MEDICAL JOURNALS OF 1908

Dr. Joseph Colt Bloodgood[2] said: "A surgeon must educate himself to differentiate between the benign and the malignant tumor of the breast at the exploratory incision. Some surgeons prefer at the exploratory incision to cut out a piece for immediate frozen section and microscopic study. This can be done in about ten minutes. For the last three years I have made immediate frozen sections of fresh tissue received in the pathological laboratory, but up to the present time a stained frozen section has never been of aid in making the diagnosis when we have been unable to come to a conclusion from the fresh appearance of the tissue, nor up to the present time have I ever depended upon a frozen section to influence the operative procedures."

The Nobel prize for the present year, "for the greatest benefaction to mankind by a discovery in medicine in recent years" was conferred on Alphonse Laveran, the discoverer of the germ of malaria (1884).[3]

Extensive series of cases of treatment and prevention of scarlet fever with dead streptococci are being reported. In Russia, Perwolf injected 283 children in 149 families and found that in those families in which the injections were made scarlet fever did not appear.[4]

Dr. J. Whitridge Williams,[5] in his paper on pubiotomy, said: "In three operations there were no maternal deaths. All began to walk in the third week. In one-third of the cases there was a permanent mobility between the cut ends of the bone. If pubiotomy fulfills its present promise, it should entirely do away with the indication of premature labor in the treatment of contracted pelves."

Dr. J. W. Hunter,[6] of Norfolk, Virginia, said: "The complete failure of medical treatment to afford any permanent relief in cases of hypertrophied prostate, as well as old age and an enfeebled constitution, makes this class of patients one of the most annoying that the practitioner is called upon to treat. Nor has surgical intervention been the precious boon that it apparently promised. . . . . Gautier, of Paris, says that nothing compares with the roentgen ray treatment of hypertrophied prostate. He used two amperes at 110 volts, and thus secured a double benefit, that is, a diminution of the residual urine and a relief from the suffering, decided results being obtained in from four to eight sittings. . . . We have (in the x-ray) a new and effective treatment. It bids fair to surpass all others in the brilliancy of its results."

Dr. George Emerson Brewer[7] said: "I have been in the habit more or less frequently of reviewing my case histories in an attempt to find data which would enable me to lessen the number of my diagnostic errors. . . . While I have never seen a cure result from decapsulation in chronic afebrile nephritis, I have observed marked improvement in two instances."

1. Kruse, H. D.; Orent, E. R.; and McCollum, E. V.: Studies on Magnesium Deficiency in Animals. Jour. Biol. Chem., 100:603, May, 1933.

2. Bloodgood, J. C.: Clinical and Pathological Differential Diagnosis of Diseases of the Female Breast. Amer. Jour. Med. Sci., 135:157, 1908.

3. J.A.M.A., 50:43, 1908.

4. Editorial, Treatment and Prevention of Scarlet Fever by Injections of Dead Streptococci. J.A.M.A., 50:43, 1908.

5. Williams, J. Whitridge: Boston Med. & Surg. Jour., 159:13, 1908.

6. Hunter, J. W.: Roentgen Ray Treatment of Hypertrophied Prostate. Amer. Jour. Med. Sci., 135:73, 1908.

7. Brewer, G. E.: An Analysis of 140 Operations on the Kidneys and Ureters. Amer. Jour. Med. Sci., 135:625, 1908.

Richmond—Where We Meet

INTRODUCTION*

The city for the 1933 meeting of the Southern Medical Association stands at the gateway to the South and is expressive in a singular degree of all the historic and traditional backgrounds of that great section as well as of its vigorous strides in the forward march of modern America.

With its roots sunk deep in the past, Richmond embodies a culture that reaches back to the dawn of English occupancy of this continent. Where the city now lies Captain John Smith, away from Jamestown on a visit to the Emperor Powhatan and his daughter Pocahontas, stood in 1607 and planned a new settlement. There, in later days, the forefathers of the Byrds of the present time actually laid off a city, and there in due course came men of great renown and events of far-reaching significance in the early years of the United States. When Time, sweeping on, brought internal war, the city was again a focal point in American history. Capital of the Confederacy, it was the gathering-place of generals and statesmen, the objective of Union assaults from every quarter, finally the scene of an evacuation which left it prostrate and largely strewn in ashes. From this momentous past it has emerged a city of metropolitan dimensions, containing within itself and its environs about a quarter of a million people, an educational, commercial, social, and medical center which is extending to the Southern Medical Association a welcome full of warmth and friendliness.

In a series of brief articles, beginning with this issue, glimpses of Richmond of the past and the present will be given by distinguished gentlemen who are writing exclusively for this JOURNAL at the request of the local publicity committee. The article which follows touches Richmond from the time of its founding until the period of the War Between the States. It was prepared by Dr. H. R. McIlwaine, the State Librarian, who is the custodian of many priceless ancient manuscripts and who is an authority of note upon the history of the Old Dominion.

RICHMOND IN BY-GONE DAYS†

Late in 1932 there was published in Richmond an unusually interesting book, "Richmond, Virginia, in Old Prints, 1737-1887." The text is by Alexander W. Weddell, now Ambassador to the Argentine, and the foreword by Douglas S. Freeman, Editor of the News-Leader, both excellent pieces of work, but in the illustrations lie the real importance of the book, since they constitute at least in part a pictorial history of the city from the earliest times. A most interesting feature of the volume is the fact that it was published under the auspices of the restored Richmond Academy of Arts, an organization founded in 1786, the oldest of its kind in America. The book is mentioned because the forerunner of the organization sponsoring it made some of the early history of the city.

The moving spirit in the original organization, the exact title of which was "The Academy of the Arts and Sciences," was a young Frenchman, Quesnay de Beaurepaire, with whom were associated many of the leading men of Virginia. The plan for the formation of a great educational institution failed, mainly because the French Revolution came on very shortly after its inception and the Frenchmen interested in it were no longer in condition to help. A building had been erected, however, the corner-stone of which was laid with great ceremony and solemnity on June 24, 1786. This building was bought by some actors, who converted it into a theatre. In it met the great Virginia Convention of 1788, which ratified the Constitution of the United States. Members of this convention were most of Virginia's famous statesmen of the time. There were, among others, John Marshall, James Madison, George Mason, Patrick Henry, Edmund Randolph, Henry Lee (Light Horse Harry), George Wythe, Benjamin Harrison, and Edmund Pendleton. The average ability of the members was greater, perhaps, than that of any other similar gathering that ever met in the United States.

St. John's Church—Scene of that stirring occasion when Patrick Henry exclaimed, "Give me liberty or give me death."

A new theatre was erected in course of time in the rear of the original Academy, and this building was the scene of the most heart-rending disaster that ever occurred in the city. On December 26, 1811, the theatre caught fire when it was filled with an audience of six hundred people enjoying the presentation of a play. Seventy-two of these people, including the Governor of the State and many prominent citizens, lost their lives. A great many of those who escaped with their lives were hurt. Since the remains of the victims could not in the majority of cases be identified, it was determined to bury them all in one grave, on the spot where the theater had stood. Later, it was determined to erect there a church by popular subscription. The Monumental Church, still standing, was the result. The first name appearing on the subscription list was that of John Marshall, the great chief justice, Richmond's most prominent citizen. His subscription was $200—a large sum for those days.

*By Dr. Joseph F. Geisinger, Chairman of Sub-Committee on Publicity, General Committee on Arrangements from the Richmond Academy of Medicine, Richmond, Virginia.

†By H. R. McIlwaine, State Librarian of Virginia, Richmond, Virginia.

To return for a minute or two to the book "Richmond, Virginia, in Old Prints," it may be stated that the second illustration therein is a reproduction of the earliest map of Richmond, a pen drawing by William Byrd II himself, the founder of Richmond, of the lots into which the land had been laid off, with the names—given in the margin—of purchasers of the lots. The date of the map is thought to be 1737. Lots 97 and 98 were given by Colonel Byrd to the vestry of Henrico Parish as a site for a church. This church, the famous St. John's, was built in 1740 and here was held, before Richmond became the capital of Virginia, the great pre-Revolutionary Virginia Convention of March, 1775, in which Patrick Henry made his fiery speech (in advocacy of preparation for war) ending with the words "Give me liberty or give me death."

A few pages further on in the book is a picture of the Old Stone House, undoubtedly the oldest building in Richmond, erected by Jacob Ege on one of the village lots purchased by him. It was put up very soon after the purchase—probably in 1738 or 1739. There is a tradition in Richmond that it was at one time the headquarters of General George Washington, but this has no foundation in fact. James Monroe boarded in the house when he was attending the Convention of 1788, and LaFayette visited it when he was in Richmond in 1824. A son born to the owner shortly after the visit was proudly named Henry LaFayette Ege. The house is now the Edgar Allan Poe Shrine.

But the temptation to follow this book through will have to be resisted and a somewhat more historical and chronological manner of presentation adopted for the remainder of this article.

The site of Richmond on the James River was first visited by the English not long after the settlement was made in 1607 at Jamestown. Powhatan Seat, the village of little Powhatan, a chief subordinate to the Emperor Powhatan, was visited, and when Captain Smith became President of the Council the place was purchased from the Indians and on account of its attractiveness and healthfulness was called "None Such." It was Smith's intention to remove many of the Jamestown settlers to this more salubrious spot. He did make a beginning in the execution of this design, but when Smith was compelled to return to England, the plan was dropped. "None Such" had to wait many years before coming into its own.

In 1645 Fort Charles was built just below the falls of the River, but was soon abandoned. In 1675 Colonel William Byrd I was granted a large tract of land within the limits of the present city, as was Nathaniel Bacon. The present capitol square is said to be a part of Bacon's plantation. Indian depredations caused Bacon, without Governor Berkeley's consent, to make war on the savages, and Berkeley's shifty treatment of him drove him into rebellion. Colonel Byrd went with Bacon on his expedition against the Indians, but then had political acumen enough to become regular, and continued to prosper. From him his son, Colonel William Byrd II, inherited a vast estate.

Under direction of the second Colonel Byrd, Major Mayo, his friend, laid off the village of Richmond (or "city" as he called it) and Colonel Byrd made money by selling the lots in the "city," to which he gave the name "Richmond" because of the likeness of the situation to that of the English Richmond on the Thames. He did not live in Richmond, however, but on his great plantation farther down the River, Westover, whereon he built a seat of the same name, the handsomest home in the Colony.

Richmond was projected by Colonel Byrd in 1733, laid off in 1737, and established by law as a town in 1742. Its growth was not considerable, however, for many years. It was at the time of the Revolutionary War probably no more populous than was Petersburg, or Fredericksburg, or Alexandria, its three sister head-of-tidewater Virginia towns. It was chosen as the place of meeting of the Convention of March, 1775, because it was more centrally located than the others. After it became the capital of the State in 1779, in the Revolutionary War, Williamsburg being too greatly exposed to the enemy, it naturally went ahead. The meetings of the General Assembly and of the higher courts of law and of the occasional conventions were most advantageous factors.

Richmond's proud position as the capital had the disadvantage, however, that it rendered her in time of war more likely to be attacked than were her sisters. In the Revolutionary War the town was captured, January 5, 1781, by Benedict Arnold, at the head of 800 men. Arnold pillaged and burned both public and private buildings and destroyed a large amount of tobacco; he took away with him or wrecked many public records; but he stayed only one night in Richmond. Then, fearing the assembling militia, he marched back to Westover and embarked on his ships.

Richmond was incorporated as a city in 1782. Its population at the time was 3,761. By 1810 its population had become 9,785; by 1820, 12,067. Its growth was steady though not phenomenal up to the time of the War Between the States. When Virginia seceded, the population was about 40,000.

At that time the wealth of Richmond in comparison with that of other cities of the same size was very considerable, and the city contained many handsome residences, some of which still remain. At least one of its public buildings was notable, the capitol, designed by Thomas Jefferson, commenced in 1785 and completed to the point of being usable by 1792. The style of the building—it was modeled after the Maison Carrée, a beautiful ancient temple in southern France—has had a great influence on the style of other state capitols in America and on domestic architecture as well.

In the capitol occurred even before the War Between the States many events of importance. All the great constitutional conventions of ante-bellum days except the one of 1788 met in the capitol. Then there were the Convention of 1850-51, which adopted the principle of white manhood suffrage, and the Convention of 1861, usually referred to as the Secession Convention, which withdrew the State from the Union. In the capitol there was placed in 1796 the Houdon Statue of Washington, probably the finest piece of sculpture in America. In 1807 there was conducted in the capitol the most interesting trial in the history of the United States, that of Aaron Burr for treason. The presiding judge was Chief Justice Marshall. The greatest lawyers of the country were either prosecuting or defending. John Randolph, of Roanoke, was foreman of the grand jury that brought in the indictment.

In a closing paragraph it may be well to mention a few of the marks of progress of Richmond from the time of her incorporation as a city to the beginning of the War Between the States. In 1787 the first

bridge across the James connecting Richmond with Manchester (now South Richmond) was built. In 1789 the Richmond Light Infantry Blues were organized—still the pride of the city. In 1813 were established regular stage lines to Lynchburg and Washington. In 1815 commenced the first regular steamboat service on James River. In 1831 the reservoir and water works were completed. In 1834 the Southern Literary Messenger, of which Edgar Allan Poe was Editor in 1835 and 1836, was founded. In 1834 the first railroad train left Richmond on the Richmond and Fredericksburg Railroad. In 1838 the Medical College was established. In 1849 Hollywood Cemetery was dedicated. In 1851 the streets were first lighted with gas. In 1854, the Mechanics Institute was established. In 1858 the Washington Monument was dedicated. In the same year a paid fire department was provided. In 1861, on April 17, Virginia seceded from the Union, and at once preparations began in Richmond and throughout the Commonwealth to conduct the war to the limit of the State's resources in men and materials.

After Richmond, Washington

WASHINGTON, THE CAPITAL*

Washington, the National Capital, with its 668 parks, its broad tree-lined avenues and its magnificent public buildings, was not thrown together by chance. The entire development of the city has been along what is known as the L'Enfant plan. It is true that this plan has not been adhered to closely and continuously throughout the years, but in the main there has been adherence to it and it is the model that is being followed today. There have been deviations from it, but Charles W. Elliott II, of the National Park and Planning Commission, is authority for the statement that such deviations usually have caused trouble.

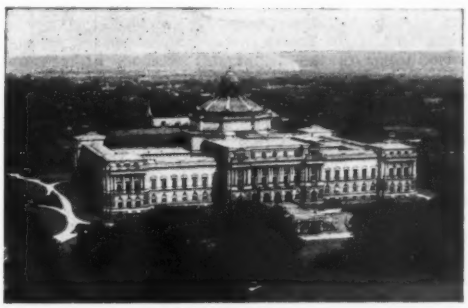
There was a time, for example, when Andrew Jackson, President of the United States, in the midst of a discussion as to where the U. S. Treasury Building should be, walked forth, stuck a cane into the ground, saying, "The building shall be here." It was placed on the site designated by Jackson. Today with its Greek architecture it is one of the show places of Washington, but as a result of Jackson's impulsiveness it is so situated as to shut off the view of the White House from the Capitol, an obstruction that was not contemplated by L'Enfant, and a blunder that cannot be corrected.

The Mall, now one of the show places of Washington, existed as an idea in the mind of L'Enfant. But the development of this area was greatly neglected and only in recent years has it come into its own. The Mall, as is well known, extends from the Capitol to the Lincoln Memorial, and takes in the landscaped areas of the U. S. Department of Agriculture, the seventy acres of the Sylvan Theater surrounding the Washington Monument and the Smithsonian grounds. Undoubtedly L'Enfant, if he could see the Mall with its two-million dollar Lincoln Memorial and great reflecting pool, would feel that his work had not been in vain.

In Washington's term as President, the Federal District, later known as the District of Columbia, was selected and laid out by Washington, Jefferson, the Secretary of State, and Major Charles Pierre L'Enfant, a highly capable French engineer employed by Washington for the task of planning the Federal city.

It is not possible in the space available here to go into detail in regard to L'Enfant's ideas. It may be said, however, that he stressed the accommodation of his plan to the topography. L'Enfant, as nearly as can be determined, did not follow any precedents in city building.

As has been stated, the plan of L'Enfant has not been followed closely and continuously through the years, but it has been revived from time to time, and since its revival in 1901 with the appointment of the McMillan Commission, headed by Senator McMillan, definite progress has been made. More park land has been acquired, a $200,000,000 Federal building program is being carried out, the Mall has been made the beautiful place that it was intended to be, and in fact many steps have been taken to place Washington at the head of the attractive world capitals.



Library of Congress

The McMillan report, a reaffirmation of the plans of L'Enfant, has been the basis of all major projects initiated since that time.

Soon Pennsylvania Avenue from the White House almost to the Capitol grounds is to be bordered on one side by the greatest array of public buildings in the history of the world, the $200,000,000 worth of Government buildings in the Federal Triangle. Here again is a tribute to L'Enfant and his capabilities. His idea was to have the mile stretch between the White House and the "hill" a scene of great beauty with mansions of foreign ministers, gardens, sloping lawns and a great religious temple. These will not rise, but in their place and following in a way his suggestion, will be the massive Government buildings heralded by the seventeen million dollar Department of Commerce home already completed.

So after the vicissitudes of the years, after dismissal from his position and twenty-five years of bitter life in the city he created, the memory of L'Enfant lives.

This man, endowed with the creative instinct, in one short year completed the basic plans for the capital of the greatest nation in the world.

*By Curtis Hodges, Executive Director of the Greater National Capital Committee of the Washington (D. C.) Board of Trade.

Book Reviews

The 1932 Year Book of Radiology. Diagnosis, edited by Charles A. Waters, M.D., Associate in Roentgenology, Johns Hopkins University. Therapeutics, edited by Ira I. Kaplan, B.Sc., M.D., Director, Division of Cancer, Department of Hospitals, City of New York; Clinical Professor of Surgery, New York University and Bellevue Medical College. 750 pages, illustrated. Chicago: The Year Book Publishers, Inc., 1932. Cloth, $6.00.

This book is the result of the painstaking study and digestion of over 70 medical journals, including state, national, and foreign publications. Approximately one-half includes abstracts on diagnosis and the remaining half is on therapy.

The abstracts on the osseous system review practically all conditions found in bones. One which is particularly interesting is by Hans R. Schniz and Erwin Uehlinger describing a large variety of tumors of the scapula. From the soft tissue abstracts the most unusual is that on calcinosis.

The chest review covering the respiratory and cardiovascular systems includes: the study of the azygos lobe and its complications; pulmonary asbestosis; actinomycosis; free fibrin bodies in the pleural space; primary angiofibroma of the diaphragm; methods of mensuration of the heart; kymoscopy; aneurysm; and visualization of varicosities.

In the genito-urinary section, the abstracts worthy of mention are the preparation of patients for pyelography with the new enzyme, "luizym;" Carhart's method for estimating kidney function; the use of the lateral pyelogram; and hysterosalpingography. The nervous system covers cerebral arteriography, among other methods.

There are abstracts on technic, medico-legal aspects, and teaching problems.

The articles are selected to represent a perspective of the field of radiology, uninfluenced by the personal ideas or opinions of the editors.

The book is to be recommended as a working reference.

The Nervous Child at School. By Hector Charles Cameron, M.A., M.D. (Cantab.), F.R.C.P. (Lond.), Physician in Charge of the Children's Department, Guy's Hospital. 160 pages. New York: Oxford University Press, 1933. Cloth, $1.50.

To the author's mind fatigue is the greatest single cause of nervousness in the child. Other factors as disorders of health and conduct must not be overlooked. Cameron says: "The delinquent is made, not born.... To learn to do good and eschew evil is a gradual response to years of training, experience and example in homes on the whole well ordered and in schools on the whole well conducted."

In the final chapters some other conditions as bed wetting, stammering and certain aphasias are discussed as related problems and conclusions drawn from the whole subject are summarized. While drawn from the English viewpoint the treatise is applicable to American life.

Procedures in Tuberculosis Control for the Dispensary, Home and Sanatorium. By Benjamin Goldberg, M.D., F.A.C.P., F.A.P.H.A., Associate Professor of Medicine, University of Illinois. With a chapter on Sanatorium Planning by Thomas B. Kidner, New York City, and an Introduction by David J. Davis, M.D., Ph.D., Dean of the College of Medicine, University of Illinois, Chicago. 373 pages with fifty-four illustrations. Philadelphia: F. A. Davis Company, publishers, 1933. Cloth, $4.00.

Goldberg points out that tuberculosis control is dependent upon eternal effort and vigilance. He approaches the problem with the public health official in mind, allocating to the general practitioner only his necessary role. Various factors taken into account in evaluating the problem in any certain area are: color, race, environment, dietetics and housing, all of which greatly influence the disease incidence.

After the primary foundation has been laid, legislation is indispensable and must be both enabling and coercive. Many persons will not cooperate to the extent of leaving home and in these cases police powers are essential. The regulations now in use in Illinois are given verbatim. The third step is the most important and the most costly, the diagnostic clinic. These may be very elaborate as the author outlines them or may consist only of the specialist, nurse and portable x-ray machine that is in use in many states. Dr. Goldberg tends toward elaborate set-ups even in treatment where he describes a large light therapy machine.

The second section gives treatment in such a superficial manner as to be useless to the practicing physician. The third section discusses sanatoria, their management, budget, methods of purchasing supplies, planning and rehabilitation of the patients. This part has received thorough detailed attention. The public health worker in tuberculosis control will find this volume worth while.

Wheat, Egg or Milk-Free Diets, with Recipes and Food Lists. By Ray M. Balyeat, M.A., M.D., F.A.C.P., Associate Professor of Medicine and Lecturer on Diseases Due to Allergy, University of Oklahoma Medical School. Assisted by Elmer M. Rusten, M.B., M.D., Chief of Section, Dermatology, of Balyeat Hay Fever and Asthma Clinic, and Ralph Bowen, B.A., M.D., Chief of Section, Pediatrics, of Balyeat Hay Fever and Asthma Clinic, Oklahoma City, Okla. 149 pages. Philadelphia: J. B. Lippincott Company, 1933. Cloth, $2.50.

This book will be found extremely helpful in the treatment of cases of food sensitization. While it pays particular attention to recipes free of milk, egg or wheat it will be found of help in sensitization to other foods as well. Of course sensitizations to the three foods mentioned form the bulk of the problem in food allergy.

The recipes are well written and all contain specific directions for their completion. The worst criticism to be directed at the book is the rather free use of butter in the milk-free recipes. The recipes all seem practical and workable.

In addition to the recipes the book contains charts of food compositions and caloric values, together with height-weight charts and suggestive blank forms for dietary instructions.

Book Reviews continued on page 664

OFFICERS 1932-1933

The following is a complete roster of the officers of the Southern Medical Association for 1932-1933, of organizations meeting conjointly with the Southern Medical Association in 1933, and of the host society, the Richmond Academy of Medicine.

President—Dr. Irvin Abell, Louisville, Kentucky.

First Vice-President—Dr. James R. Garber, Birmingham, Alabama.

Second Vice-President—Dr. Hugh J. Morgan, Nashville, Tennessee.

Secretary-Manager—Mr. C. P. Loranz, Birmingham, Alabama.

Editor of Journal—Dr. M. Y. Dabney, Birmingham, Alabama.

Assistant Editor of Journal—Mrs. Eugenia B. Dabney, Birmingham, Alabama.

Councilors—Dr. Homer Dupuy, Chairman, New Orleans, Louisiana; Dr. M. Toulmin Gaines, Mobile, Alabama; Dr. Morgan Smith, Little Rock, Arkansas; Dr. William Gerry Morgan, Washington, D. C.; Dr. Edward Jelks, Jacksonville, Florida; Dr. Frank K. Boland, Atlanta, Georgia; Dr. C. W. Dowden, Louisville, Kentucky; Dr. Edward A. Looper, Baltimore, Maryland; Dr. Inman W. Cooper, Meridian, Mississippi; Dr. M. Pinson Neal, Columbia, Missouri; Dr. Paul H. Ringer, Asheville, North Carolina; Dr. Lea A. Riely, Oklahoma City, Oklahoma; Dr. Frank H. McLeod, Florence, South Carolina; Dr. Eugene Rosamond, Memphis, Tennessee; Dr. Elbert Dunlap, Dallas, Texas; Dr. R. Finley Gayle, Jr., Richmond, Virginia; Dr. James R. Bloss, Huntington, West Virginia.

Board of Trustees (All are Past-Presidents)—Dr. J. Shelton Horsley, Chairman, Richmond, Virginia; Dr. William R. Bathurst, Little Rock, Arkansas; Dr. Thomas W. Moore, Huntington, West Virginia; Dr. Hugh S. Cumming, Washington, D. C.; Dr. Felix J. Underwood, Jackson, Mississippi; Dr. L. J. Moorman, Oklahoma City, Oklahoma.

Section on Medicine—Dr. I. I. Lemann, Chairman, New Orleans, Louisiana; Dr. Cabot Lull, Vice-Chairman, Birmingham, Alabama; Dr. Ernest B. Bradley, Secretary, Lexington, Kentucky.

Section on Pediatrics—Dr. Hugh L. Dwyer, Chairman, Kansas City, Missouri; Dr. Charles E. Conrad, Vice-Chairman, Harrisonburg, Virginia; Dr. Luther W. Holloway, Secretary, Jacksonville, Florida.

Section on Gastroenterology—Dr. Daniel N. Silverman, Chairman, New Orleans, Louisiana; Dr. James Alto Ward, Vice-Chairman, Birmingham, Alabama; Dr. Ernest H. Gaither, Secretary, Baltimore, Maryland.

Section on Pathology—Dr. J. A. McIntosh, Chairman, Memphis, Tennessee; Dr. Harvey S. Thatcher, Vice-Chairman, Little Rock, Arkansas; Dr. Wiley D. Forbus, Secretary, Durham, North Carolina.

Section on Neurology and Psychiatry—Dr. R. G. Spurling, Chairman, Louisville, Kentucky; Dr. W. W. Young, Vice-Chairman, Atlanta, Georgia; Dr. J. H. Royster, Secretary, Richmond, Virginia.

Section on Radiology—Dr. C. H. Heacock, Chairman, Memphis, Tennessee; Dr. K. F. Kesmodel, Vice-Chairman, Birmingham, Alabama; Dr. Vincent W. Archer, Secretary, University, Virginia.

Section on Dermatology and Syphilology—Dr. Andrew L. Glaze, Chairman, Birmingham, Alabama; Dr. Jack W. Jones, Vice-Chairman, Atlanta, Georgia; Dr. Dudley C. Smith, Secretary, University, Virginia.

Section on Surgery—Dr. Edwin P. Lehman, Chairman, University, Virginia; Dr. Samuel L. Ledbetter, Jr., Vice-Chairman, Birmingham, Alabama; Dr. Daniel C. Elkin, Secretary, Atlanta, Georgia.

Section on Bone and Joint Surgery—Dr. J. Albert Key, Chairman, St. Louis, Missouri; Dr. H. Earle Conwell, Vice-Chairman, Fairfield, Alabama; Dr. J. Warren White, Secretary, Greenville, South Carolina.

Section on Gynecology—Dr. Percy H. Wood, Chairman, Memphis, Tennessee; Dr. John W. Turner, Vice-Chairman, Atlanta, Georgia; Dr. Lee F. Turlington, Secretary, Birmingham, Alabama.

Section on Obstetrics—Dr. E. L. King, Chairman, New Orleans, Louisiana; Dr. Percy W. Toombs, Vice-Chairman, Memphis, Tennessee (deceased); Dr. Richard Paddock, Secretary, St. Louis, Missouri.

Section on Urology—Dr. Nelse F. Ockerblad, Chairman, Kansas City, Missouri; Dr. I. G. Duncan, Vice-Chairman, Memphis, Tennessee; Dr. Hamilton W. McKay, Secretary, Charlotte, North Carolina.

Section on Railway Surgery—Dr. E. Dunbar Newell, Chairman, Chattanooga, Tennessee; Dr. S. O. Black, Vice-Chairman, Spartanburg, South Carolina; Dr. J. W. Palmer, Secretary, Ailey, Georgia.

Section on Ophthalmology and Otolaryngology—Dr. William D. Gill, Chairman, San Antonio, Texas; Dr. E. W. Rucker, Jr., Vice-Chairman, Birmingham, Alabama; Dr. William A. Wagner, Secretary, New Orleans, Louisiana.

Section on Medical Education—Dr. John Walker Moore, Chairman, Louisville, Kentucky; Dr. Earl B. McKinley, Vice-Chairman, Washington, D. C.; Dr. Ernest W. Goodpasture, Secretary, Nashville, Tennessee.

Section on Public Health—Dr. Joseph W. Mountin, Chairman, Washington, D. C.; Dr. Leon Banov, Vice-Chairman, Charleston, South Carolina; Dr. Douglas L. Cannon, Secretary, Montgomery, Alabama.

National Malaria Committee (meeting conjointly with Southern Medical Association)—Dr. L. O. Howard, Honorary Chairman, Washington, D. C.; Dr. Charles F. Craig, Chairman, New Orleans, Louisiana; Dr. Henry Hanson, Chairman-Elect, Jacksonville, Florida; Dr. L. L. Williams, Jr., Vice-Chairman, Washington, D. C.; Dr. Mark F. Boyd, Secretary-Treasurer, Tallahassee, Florida.

American Society of Tropical Medicine (meeting conjointly with Southern Medical Association)—Dr. G. R. Callender, President, Fort Sam Houston, Texas; Dr. A. W. Sellards, First Vice-President, Boston, Massachusetts; Dr. W. A. Sawyer, Second Vice-President, New York, New York; Dr. Henry E. Meleney, Secretary-Treasurer, Nashville, Tennessee; Dr. Damaso de Rivas, Assistant Secretary, Philadelphia, Pennsylvania.

American Public Health Association, Southern Branch (meeting conjointly with Southern Medical Association)—Dr. E. L. Bishop, President, Nashville, Tennessee; Dr. J. H. Mason Knox, Jr., First Vice-President, Baltimore, Maryland; Dr. J. D. Dowling, Second Vice-President, Birmingham, Alabama; Miss Margaret East, Third Vice-President, Louisville, Kentucky; Dr. R. H. White, Secretary-Treasurer, Nashville, Tennessee.

Society for Experimental Biology and Medicine, Southern Section (meeting conjointly with Southern Medical Association)—Dr. Ernest Carroll Faust, Chairman, New Orleans, Louisiana; Dr. Harold Cummins, Vice-Chairman, New Orleans, Louisiana; Dr. Charles F. Craig, Secretary, New Orleans, Louisiana.

Women Physicians of Southern Medical Association—Dr. Ray K. Daily, Chairman, Houston, Texas; Dr. Rosalie Slaughter Morton, Vice-Chairman, Winter Park, Florida; Dr. Willena Peck, Secretary, Montevallo, Alabama.

Woman's Auxiliary to the Southern Medical Association—Mrs. A. A. Herold, President, Shreveport, Louisiana; Mrs. Southgate Leigh, President-Elect, Norfolk, Virginia; Mrs. J. Bonar White, First Vice-President, Atlanta, Georgia; Mrs. Sidney W. Collier, Second Vice-President, Birmingham, Alabama; Mrs. Earl D. McBride, Recording Secretary, Oklahoma City, Oklahoma; Mrs. C. B. Erickson, Corresponding Secretary, Shreveport, Louisiana; Mrs. W. B. Majors, Treasurer, Birmingham, Alabama; Mrs. J. D. Thompson, Historian, Port Arthur, Texas; Mrs. V. A. Stilley, Parliamentarian, Benton, Kentucky.

RICHMOND ACADEMY OF MEDICINE, Richmond, Virginia, Host to the Southern Medical Association, Twenty-Seventh Annual Meeting, November 14-17, 1933.

President, Dr. Carrington Williams. *First Vice-President*, Dr. Turner S. Shelton. *Second Vice-President*, Dr. J. Powell Williams. *Secretary-Treasurer*, Dr. Thomas D. Jones. *Chairman of Program Committee*, Dr. Karl S. Blackwell. *Chairman Board of Trustees*, Dr. Wyndham B. Blanton. *Chairman Board of Censors*, Dr. Joseph F. Geisinger.

Chairmen of Local Committees on Arrangements

General Chairman, Dr. Fred M. Hodges. *Honorary Vice-General Chairmen*, Dr. Stuart McGuire, Dr. J. Shelton Horsley, and Dr. James K. Hall. *Finance*, Dr. W. H. Higgins. *Entertainment*, Dr. Beverley R. Tucker. *Program or Clinics*, Dr. I. A. Bigger. *Meeting Places*, Dr. R. Finley Gayle, Jr. *Hotels*, Dr. J. Powell Williams. *Publicity*, Dr. Joseph F. Geisinger. *Scientific Exhibits*, Dr. W. Ambrose McGee. *Technical Exhibits*, Dr. J. B. Dalton. *Alumni Reunions and Fraternity Luncheons*, Dr. H. H. Ware, Jr. *Membership*, Dr. C. M. Caravati. *Information*, Dr. J. S. Horsley, Jr. *Transportation*, Dr. Arthur S. Brinkley. *Signs and Badges*, Dr. Garland Harwood. *Lanterns*, Dr. J. L. Tabb. *Golf*, Dr. Paul W. Howle. *Trap Shooting*, Dr. W. B. Porter. *Women Physicians*, Dr. Pauline Williams. *Ladies' Entertainment*, Mrs. Stuart McGuire, Chairman; Mrs. J. B. Dalton, Vice-Chairman.

Book Reviews

Continued from page 662

Light Therapy. By Frank Hammond Krusen, M.D., Director of the Department of Physical Medicine, Temple University School of Medicine, Philadelphia. Foreword by John A. Kilmer, M.D., Dr.P.H., D.Sc., LL.D., Professor of Medicine, Temple University School of Medicine. 186 pages with 33 illustrations. New York: Paul B. Hoeber, Inc., 1933. Cloth, $3.50.

The intelligent use of light therapy requires a knowledge of its sources, the physics, the physiologic reaction of the body to its use as well as ability to turn on the switch. This book not only explains the basic principles, but gives detailed technic for the various applications of light therapy. The recommendations for light therapy are almost as long as the entire list of diseases. The writer carefully lists these and then in a few brief words states in a very conservative manner those in which he has found the lights of value. The physician will find this an excellent contemporary work on a subject that is still in a state of flux and in which enthusiasm must be tempered with knowledge and discernment.

Towards Mental Health: The Schizophrenic Problem. By Charles Macfie Campbell. 110 pages. Cambridge: Harvard University Press, 1933. Cloth, $1.25.

Dr. Campbell delivered the three lectures which are contained in this monograph to a mixed audience at the University of Illinois. In the first chapter a number of cases are presented showing the reaction of the individual to stress, and the relationship of environment and childhood training to this reaction. In the second chapter he takes up management of the sexual instinct, memories dealing with past sexual experiences, the relation of the individual to the parents and the personal value of the individual. In the third chapter heredity and environment are presented as factors in the picture and the entire subject is correlated. The further addition of a summary enhances the value of the book. Throughout one is struck by the smallness and at times inconsequential acts and thoughts that may throw the human mentality into a pathologic state. The book will be of value to advanced lay students.

Diseases of the Skin. A Manual for Students and Practitioners. By the late Robert W. MacKenna, M.A., M.D., B.Ch. (Edin.), Sometime Lecturer in Dermatology at the University of Liverpool. Third Edition. Revised and Enlarged by Robert M.B. MacKenna, M.A., M.D., B.Ch. (Camb.), M.R.C.P. (Lond.), M.R.C.S. (Eng.), Honorary Consulting Dermatologist, Liverpool Heart Hospital. 503 pages with 45 colored plates, 149 illustrations in the text and many formulae. Baltimore: William Wood & Co., 1933. Temporary price, $6.00; published price, $8.00.

The work of the father has been carried on by the son very capably in this revision of the former's work. The scope of the book has not been enlarged, but descriptions have been clarified, new therapeutic agents included and a number of illustrations have been added. In the description of epithelioma no mention is made of chancroid as a possible condition to be differentiated. Noteworthy is the use of large doses of neoarsphenamine in the treatment of lues, 0.9 c. c. being given at a single injection. The simplicity and clearness of the descriptions and the completeness of the therapeutic regime are a boon to the general practitioner who carefully studies each case.

Southern Medical News

ALABAMA

Dr. James S. McLester, Birmingham, was reelected a member of the Council on Medical Education and Hospitals of the American Medical Association at the recent annual session in Milwaukee.

Dr. Alfred A. Walker, Birmingham, was elected Chairman of the Section on Diseases of Children of the American Medical Association at the annual session in Milwaukee last month.

The Tuscaloosa County Medical Society and the medical staff of the Veterans' Administration Faculty held a joint meeting in Tuscaloosa in May, which was devoted to the presentation of cases.

Dr. David S. Moore, Jr., Birmingham, is the newly elected President of the Alumni Association of the University of Alabama School of Medicine.

Deaths

Dr. William Bulger Johnson, Birmingham, aged 53, died suddenly March 26 of chronic endocarditis and myocarditis.

Dr. Hugh Lownds Appleton, Gadsden, aged 67, died April 16 of pyemia and abscess of the lung.

Dr. Horace Leon Cunningham, Acmar, aged 49, died in April of coronary occlusion.

Dr. William Lewis Dinsmore, Decatur, aged 81, died March 28 of arteriosclerosis.

ARKANSAS

The First Councilor District Medical Society, composed of Clay, Craighead, Crittenden, Greene, Lawrence, Mississippi, Poinsett and Randolph Counties, has elected the following officers for the coming year: Dr. C. M. Harwell, Osceola, President; Dr. J. E. McGuire, Piggott, Vice-President; and Dr. F. D. Smith, Blytheville, Secretary-Treasurer.

The Pulaski County Medical Society has elected the following officers for 1933: Dr. S. C. Fulmer, President; Dr. Paul L. Mahoney, Vice-President; Dr. Ernest Harl White, Secretary; and Dr. William R. Bathurst, Treasurer; all of Little Rock.

Dr. Charles A. Arkebauer, Little Rock, has been elected chief of the medical staff of the State Hospital for Nervous Diseases, having been associated with the hospital for thirty-two years.

Dr. George A. Hays, Pine Bluff, has resigned as Director of the City and Jefferson County Health Departments.

Dr. B. D. Luck, Pine Bluff, has been appointed to succeed Dr. M. D. Ogden, Little Rock, as a member of the State Board of Nurse Examiners.

Deaths

Dr. Charles U. Harrison, Little Rock, aged 79, died February 5.

Dr. Goodson Cox, Mount Ida, aged 87, died February 23 of senility.

Dr. Alphonso Isom, Dumas, aged 47, died April 24 of heart disease.

Dr. Napoleon B. Beakley, England, aged 69, died April 15 of heart disease.

Dr. James H. Kennerley, Batesville, aged 86, died May 13.

DISTRICT OF COLUMBIA

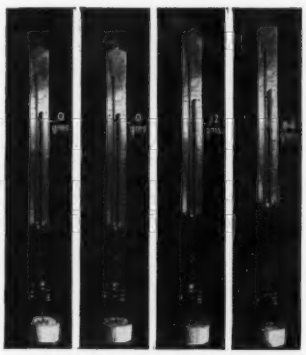
The Medical Society of the District of Columbia has elected the following officers for the coming year: Dr. Prentiss Willson, President; Dr. Daniel LeRay Borden, First Vice-President; Dr.

Continued on page 18

CURD TENSION

- AND INFANT FEEDING -

ITS · EFFECT · UPON · THE · ASSIMILATION · OF PROTEINS



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C—Cow's milk S—Similac
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"It is the formation of large curds which renders the casein of cow's milk so much more difficult of digestion by the infant than that of human milk. If the formation of large casein curds in the stomach can be prevented, the casein of cow's milk is easily digested." [1]

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[1] Morse and Talbott, Diseases of Nutrition and Infant Feeding, pgs. 214, 215.

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Continued from page 664

Margaret M. Nicholson, Second Vice-President; and Dr. Coursen B. Conklin, Secretary-Treasurer; all of Washington.

The teaching staff of George Washington University School of Medicine early in June held a series of clinics and demonstrations covering a number of the specialties, which included visits to the various hospitals.

Georgetown University School of Medicine has secured the services of Dr. Owen Stanley Gibbs, a native of Leicestershire, England, to fill the chair of physiology. Dr. Wilbur F. Potter will be Assistant Professor of Physiology under Dr. Gibbs.

The Medical Society of the District of Columbia recently held a banquet at the Shoreham Hotel in connection with the fifth annual Clinical Session of the Society, at which time they voted to make the banquet an annual affair.

Dr. A. Rumreich, Washington, was recently in Louisiana for the study of typhoid fever, and also visited points in Alabama and Georgia in connection with typhus fever studies.

Dr. G. A. Wheeler, Washington, was recently on temporary duty at Milledgeville, Georgia, in connection with field studies of nutrition.

Dr. M. V. Veldee, Washington, has been temporarily stationed at points in Maryland in connection with the control of biologic products.

Dr. Lawrence Kolb, Washington, was recently dispatched to Springfield, Missouri, to arrange for receipt, storage and installation of equipment at the Hospital for Defective Delinquents.

Dr. C. C. Applewhite, formerly stationed at Boston, has been assigned to duty at Washington.

FLORIDA

The Florida Medical Association has elected the following officers for the coming year: Dr. Homer L. Pearson, Miami, President-Elect; Dr. George C. Tillman, Gainesville, First Vice-President; Dr. J. Ralston Wells, Daytona Beach, Second Vice-President; Dr. Henry J. Peavy, Fort Lauderdale, Third Vice-President; and Dr. Shaler Richardson, Jacksonville, reelected Secretary-Treasurer. Dr. William M. Rowlett, Tampa, is the incoming President.

Representatives of Palm Beach, Broward and Dade Counties, at the close of the annual state meeting, met with state and government health officials to organize in order to assist the Federal Government in bettering the mosquito conditions in the three counties.

The Florida Heart Association, at its third annual meeting, elected the following officers for the coming year: Dr. W. C. Blake, Tampa, President; Dr. Louie Limbaugh, Jacksonville, First Vice-President; Dr. E. Sterling Nichol, Miami, Second Vice-President; and Dr. George L. Cook, Tampa, Secretary-Treasurer.

Drs. Cleveland, Hoskins and McClamrock, Miami, have been named resident house physicians of the Jackson Memorial Hospital for the coming year.

Dr. W. Lee Ashton, Umatilla, has been appointed a Director of the Harry-Anna Crippled Children's Home; and also house physician and manager of the institution.

DEATHS

Dr. William Joseph Lee, Panama City, aged 61, died April 22 of heart disease.

Dr. Milton Walton, Hastings, aged 51, died April 23 of heart disease.

Dr. Francis Drew Randall, Tampa, aged 74, died March 18 of influenza, chronic cystitis and uremia.

Dr. George Rex Andrews, Cedar Keys, aged 58, died suddenly April 6 of heart disease.

Dr. George Lewis Dickerson, Jacksonville, aged 63, died March 16 of heart disease.

GEORGIA

The Georgia State Medical Association, at its annual meeting in May, elected the following officers for the coming year: Dr. Clarence L. Ayers, Toccoa, President-Elect; Dr. Joseph D. Applewhite, Macon, First Vice-President; and Dr. William W. Tur-

Continued on page 20

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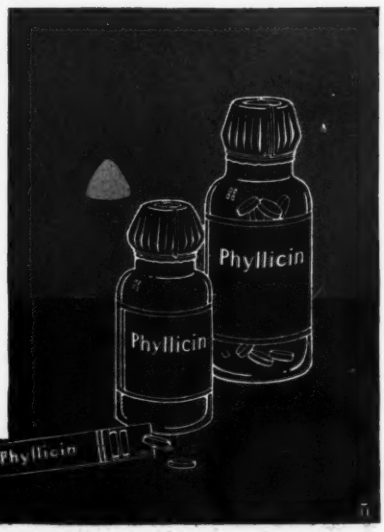
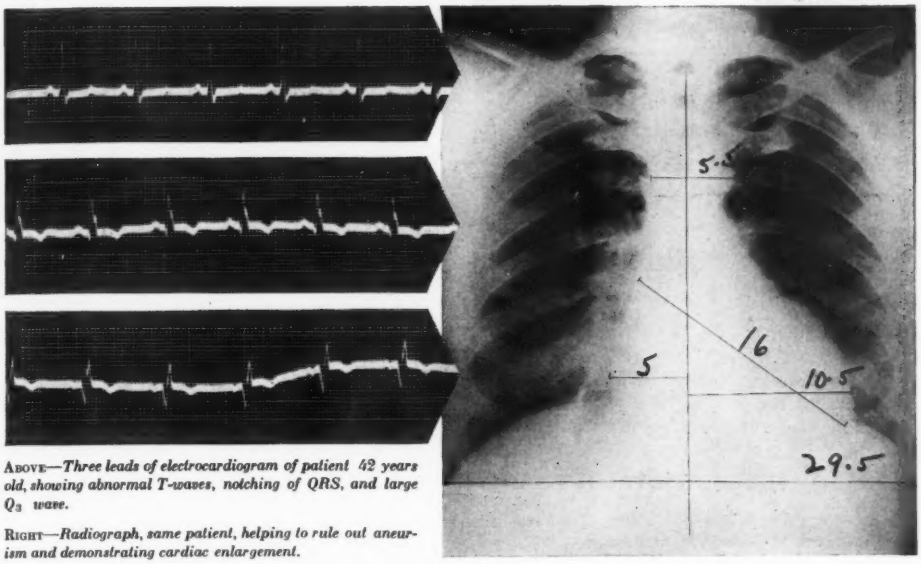


"Acute Indigestion" after Forty



ABOVE—*Three leads of electrocardiogram of patient 42 years old, showing abnormal T-waves, notching of QRS, and large Q_3 wave.*

RIGHT—*Radiograph, same patient, helping to rule out aneurism and demonstrating cardiac enlargement.*

WHEN a patient complains of pains and discomfort after meals; when the general symptoms point to dyspepsia, yet are not conclusive, add cardiograms and a radiograph of the heart to your means of diagnosis. It is not uncommon for coronary disease, aortitis, aneurism, and numerous other conditions to present symptoms that might easily be interpreted as a digestive disorder.

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HORLICK'S, Racine, Wis.

Continued from page 18

ner, Jr., Nashville, Second Vice-President. Dr. Charles H. Richardson, Jr., Macon, was installed as President.

Dr. G. Lombard Kelly, Augusta, was awarded the Crawford W. Long Memorial Prize medal for the best paper presented at the 1932 session of the State Medical Association.

Dr. Roy R. Kracke, Emory University, Atlanta, received the distinction of being the first to have his name engraved on the Hardman Silver Loving Cup for the best original work done in 1932.

The Georgia Urological Association, at its annual meeting recently, elected the following officers for the coming year: Dr. W. B. Emery, Atlanta, President-Elect; and Dr. Major F. Fowler, Atlanta, Secretary-Treasurer.

The Georgia Pediatrics Society has elected the following officers for the coming year: Dr. Benjamin Bashinski, Macon, President-Elect; Dr. W. W. Anderson, Atlanta, Vice-President; and Dr. Roger W. Dickson, Atlanta, reelected Secretary-Treasurer. Dr. Joseph Yampolski, Atlanta, is the incoming President.

The Emory Alumni Clinics of Emory University, Atlanta, consisting of lectures, ward walks and clinics, were held early in June.

Dr. James E. Paullin, Atlanta, was elected a member of the Council on Scientific Assembly of the American Medical Association at the annual meeting in Milwaukee last month.

Physicians of Milledgeville participated in a Child Welfare Institute which was held early in May.

The annual meeting of the Georgia Tuberculosis Association was held at Atlanta May 4.

Dr. Clarence Lunsford Laws has opened offices at 35 Fourth Street, N. E., Atlanta, for the practice of internal medicine and allergic diseases.

Dr. and Mrs. S. A. Scruggs, Americus, entertained members of the Sumter County Medical Society at dinner recently, which was followed by a scientific meeting.

Dr. and Mrs. J. H. McClure, Cornelia, recently entertained members of the Habersham County Medical Society and Woman's Auxiliary.

The University of Georgia Medical Department recently celebrated the observance of Crawford W. Long Day, commemorating the ninetieth anniversary of the discovery of ether anesthesia.

DEATHS

Dr. Reece N. Weaver, Atlanta, aged 68, died February 7.

Dr. James Madison Wellborn, Rock Springs, aged 64, died April 6 in a Chattanooga hospital.

Dr. Henry Adoniram Vann, Boston, aged 83, died April 17 of cerebral hemorrhage.

Dr. H. R. Ingram, Coleman, aged 61, died April 29 in a Cuthbert hospital.

Dr. Daniel Holland Ogden, Odum, aged 65, died May 1.

Dr. John W. Daniel, Franklin, aged 84, died suddenly April 18.

Dr. Marshall H. Stephens, Bremen, died May 6 in a Villa Rica hospital.

Dr. John Collier McRae, Atlanta, aged 37, died suddenly while at his office May 6.

KENTUCKY

The Eye and Ear specialists of Kentucky met at Paducah in May for their annual meeting and elected the following officers for the coming year: Dr. S. B. Marks, Lexington, President; Dr. A. L. Bass, Louisville, Vice-President; Dr. Carlton Thomas, Lexington, Secretary; and Dr. Walter Dean, Louisville, Treasurer. Dr. Lee Wallace Dean, Washington University, St. Louis, was the guest speaker at the session.

The Daviess County Medical Society's committee appointed for the purpose of investigating the report of the Committee on the Cost of Medical Care has gone on record with resolutions opposing the majority report of the Committee.

Dr. Jacob Nathaniel Bailey and Miss Nell Cunliff, both of Paducah, were married May 8.

DEATHS

Dr. Walter Warder Dye, Ewing, aged 84, died April 27 of tuberculosis.

Dr. Eugene McDowell Trabue, Louisville, aged 43, died April 8 of heart disease.

LOUISIANA

Physicians of the Fourth District met in Shreveport at the Charity Hospital in April for their semi-annual gathering, with an attendance of over seventy-five.

Continued on page 22

FOR DIGESTIVE DISTURBANCES . . .

use this LACTIC ACID MILK

with these practical advantages

In the treatment of digestive disturbances of infants and for the premature or athreptic infant, Merrell-Soule Powdered Whole Lactic Acid Milk (Cultured) offers these very practical advantages:

It is easily digested — Approximates breast milk in digestive qualities — the spray process of drying breaks up the fat and proteins into fine particles which combine readily with the gastric juices.

Its correct acidity promotes the assimilation of calcium.

It is nutritious—Contains all the vitamins and nutritive properties of grade A pasteurized milk.

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It is uniform—No possibility of variation in quality or content or in the resulting formula.

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It is economical and easy to use—Reliquefied by mixing in the proportion of one packed level tablespoon of the powder to two ounces of warm water — then stirred into *complete* solution.

Samples and literature on Merrell-Soule Powdered Whole Lactic Acid Milk and Merrell-Soule Powdered Skimmed Lactic Acid Milk are available to Physicians on request.

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POWDERED WHOLE
LACTIC ACID MILK

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Continued from page 20

Dr. Isidore Cohn, New Orleans, has been appointed to succeed the late Dr. A. C. King as Professor of Surgery and Head of the Department of Surgery at the Graduate School of Medicine, Tulane University.

Dr. Amos Graves, New Orleans, is taking a two years' leave of absence from the Department of Surgery of Tulane University, during which time he will be in the Department of Neuro-Surgery of the Washington University, St. Louis, assisting Dr. Ernest Sachs.

Dr. Daniel N. Silverman, New Orleans, has been elected to membership in the Southern Section, Society of Experimental Biology and Medicine, on his experimental work.

Dr. W. Y. Hollingsworth, New Orleans, was recently transferred temporarily to Galveston, Texas, to do some investigative work.

Dr. D. W. Patrick, formerly of New Orleans, has been transferred to Seattle, Washington.

Deaths

Dr. Alfred Clinton King, New Orleans, aged 64, died April 1 of pneumonia.

Dr. Charles Raphael Mayer, New Orleans, aged 72, died February 11.

Dr. Louis E. Bergeron, Baton Rouge, aged 57, died March 16 of cerebral hemorrhage and cardiorenal disease.

Dr. Charles W. Loomis, Lake Charles, aged 65, died April 3 of septicemia.

Dr. Valerian Albert Miller, Lake Arthur, aged 60, died April 18 of heart disease.

MARYLAND

The Medical and Chirurgical Faculty of Maryland, at their annual meeting in April, elected the following officers for the coming year: Dr. George O. Sharrett, Cumberland, President: Dr. George C. Lockard, Baltimore, Dr. William R. White, Ellicott City, and Dr. John L. Riley, Snow Hill, Vice-Presidents.

St. Mary's County now has a full-time health unit, Dr. David T. Bowden, Jr., having been appointed Health Officer.

Dr. Philip Bard, formerly Assistant Professor of Physiology at Harvard University Medical School, is the newly appointed Professor of Physiology at Johns Hopkins University School of Medicine.

The University of Maryland, Division of Medical Extension, conducted its tenth annual review course for physicians in June.

Dr. William Hobson Woody and Miss Sarah Anne Mellier, both of Baltimore, were married in April.

Deaths

Dr. William Lawrence Burns, Cumberland, aged 50, died April 1 of coronary occlusion.

Dr. Jere Williams Lord, Baltimore, aged 69, died April 23.

Dr. Eli Grellet Jones, Middletown, aged 82, died January 26 of heart disease.

MISSISSIPPI

The Mississippi State Medical Association, at its annual meeting recently, elected the following officers for the coming year: Dr. E. C. Parker, Gulfport, President-Elect; Dr. E. R. Nobles, Rosedale, Dr. J. A. K. Birchett, Vicksburg, Dr. C. C. Hightower, Hattiesburg, Vice-Presidents; Dr. E. L. Wilkins, Clarksdale, reelected Treasurer; and Dr. T. M. Dye, Clarksdale, reelected Secretary.

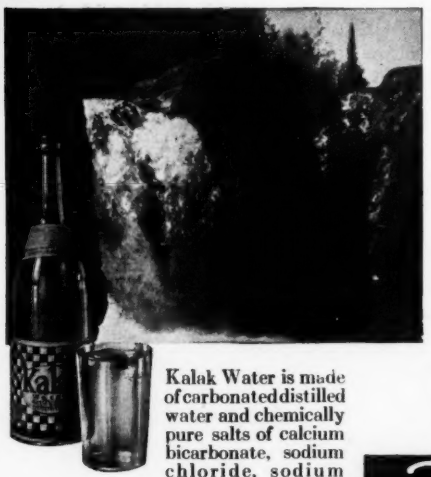
The Mississippi State Hospital Association has elected the following officers for the coming year: Dr. R. J. Field, Centreville, President; Dr. V. B. Philpot, Houston, Vice-President; and Dr. L. S. Lippincott, Vicksburg, Secretary-Treasurer.

Dr. H. C. Ricks, Jackson, Director of County Health Work and Epidemiology, Mississippi State Board of Health, left in May to make a series of visits to Northern and Eastern cities for the purpose of observing the public health programs, having been given a travel grant by the Commonwealth Fund.

Dr. R. N. Crockett, Winterville, is in Memphis taking a special course in diseases of the heart at the University of Tennessee.

Continued on page 24

A Pure, Palatable, Carbonated



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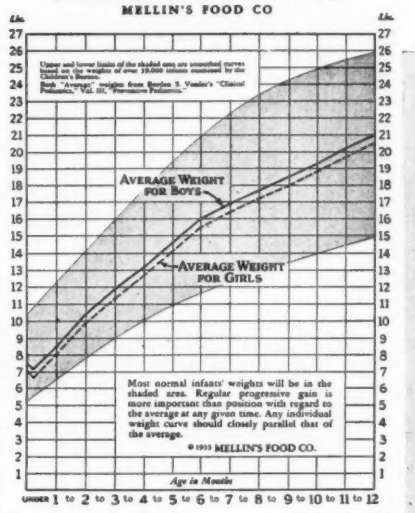
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Upper and lower limits of the shaded area are smoothed curves based on the weights of over 10,000 infants examined by the Children's Bureau.
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AVERAGE WEIGHT FOR GIRLS
Most normal infants' weights will be in the shaded area. Regular progressive gain is more important than position with regard to the average at any given time. Any individual weight curve should closely parallel that of the average.
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Age in Months
UNDER 1 to 2 to 3 to 4 to 5 to 6 to 7 to 8 to 9 to 10 to 11 to 12

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In keeping with our policy—*no advertising or feeding formulas for the public*—this new chart will be distributed upon request to physicians only.

MELLIN'S FOOD CO.
Boston, Mass.

No
ADVERTISING
or feeding formulas
for the public.

Continued from page 22

DEATHS

Dr. James Anderson Donaldson, Okolona, aged 56, died March 27 of cirrhosis of the liver.

Dr. James P. T. Stephens, Vaiden, aged 56, died April 29 in an automobile accident.

MISSOURI

The Ear, Nose and Throat Club of St. Louis has elected the following officers for the coming year: Dr. L. W. Dean, Acting President and Senior Member of the Executive Committee; and Dr. B. J. McMahon, Secretary.

Dr. John R. Caulk, St. Louis, is the newly elected President of the American Association of Genito-Urinary Surgeons.

The Kansas City Urological Society has elected the following officers for the coming year: Dr. Oscar Davidson, Kansas City, Kansas, President; Dr. Julius Frischer, Kansas City, Missouri; and Dr. Irwin S. Brown, Kansas City, Missouri.

Dr. Evarts A. Graham, St. Louis, delivered an address at the Arkansas Medical Society's fiftieth annual meeting in May.

The Ella Oliver Home

A private maternity home for the care and protection of unfortunate girls during pregnancy and confinement.

Under auspices of Women's Christian Association of this city.

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Dr. B. J. McMahon, St. Louis, was a guest speaker on the program of the American Laryngological, Rhinological and Otological Society at its meeting in Chicago in June.

Dr. Robert P. C. Wilson, Platte City, Superintendent of Cedar Hurst Sanitarium, has been appointed to succeed Dr. E. E. Brunner as Superintendent of the Missouri State School at Marshall.

Dr. B. A. Wilkes, Cape Girardeau, has resigned as Superintendent of the Southeast Missouri Hospital at Cape Girardeau.

Dr. S. A. Newman has succeeded Dr. E. E. Glenn as Superintendent of the Missouri State Sanatorium at Mount Vernon.

Dr. Dudley S. Conley, Columbia, has been appointed Dean of the University of Missouri School of Medicine to succeed Dr. Edgar Allen, who has resigned to become a member of the faculty of the Yale University School of Medicine. Dr. Conley is Professor of Surgery in the University Medical School.

The Washington University School of Medicine, St. Louis, recently received a gift from Dr. Charles S. Austin, Carrollton, an alumnus, of 1,250 copies of the American Medical Journal, dating from 1909.

Dr. McKim Marriott, St. Louis, was a guest speaker recently at a meeting of the Eighth District Medical Society of North Carolina.

Dr. C. E. Rice, Rolla, recently went to Washington, D. C., for a conference on trachoma work.

The Benton-Dallas-Hickory-Polk County Medical Society has elected the following officers for the coming year: Dr. A. S. Johnston, Wheatland, President; Dr. R. E. Harrell, Urbana, First Vice-President; Dr. A. J. Stufflebam, Humansville, Second Vice-President; and Dr. J. L. Johnston, Wheatland, Secretary and Treasurer.

The Pike County Medical Society has elected the following officers for the coming year: Dr. Charles P. Lewellen, Louisiana, President; Dr. C. D. Scott, Louisiana, Vice-President; and Dr. T. Hurley Wilcoxon, Bowling Greene, Secretary-Treasurer.

DEATHS

Dr. Henry Joseph Scherck, St. Louis, aged 65, died March 29 of heart disease.

Dr. John Christian Martin, Kansas City, aged 59, died April 11.

Dr. Richard Ray, Kansas City, aged 69, died April 2 of cerebral hemorrhage.

Dr. Edward T. Moore, Kansas City, aged 76, died March 29 from an injury received in a fall.

Dr. John Clark Bowman, Cameron, aged 60, died April 2 of heart disease.

Dr. William Maclay Lyon, Kansas City, aged 58, died March 8 of heart disease.

Dr. David Robert Griffith, Creighton, aged 79, died March 22.

Dr. Lewis Carthrae, Corder, aged 60, died suddenly March 12.

NORTH CAROLINA

Dr. W. B. Murphy, Snow Hill, was host recently to the Fourth District Medical Society. Members were entertained at supper, after which a scientific program was enjoyed.

Dr. Charles R. Stockard, Professor of Anatomy at Cornell University, was a recent lecturer at the Duke Hospital, Durham.

The building occupied by the State Laboratory of Hygiene in Raleigh has been designated by the State Legislature as the Clarence A. Shore State Laboratory of Hygiene Building in memory of Dr. Clarence A. Shore, who died recently. Dr. Shore was Director of the Laboratory for twenty-five years.

Dr. David E. Ford, New Bern, has been appointed Health Officer of Beaufort County.

Dr. Lester P. Martin, Mocksville, is the newly appointed Health Officer of Davie County.

Dr. Stephen Glenn Wilson, Clinton, has been appointed Health Officer of Sampson County.

Dr. George E. Newby, Hertford, has been appointed Health Officer of Perquimans County.

Dr. Alvin Wortham Peede and Miss Eula Johnson, both of Lillington, were married March 11.

Dr. Newton F. Lancaster, Waynesville, and Miss Marion Houchias were married in April.

Dr. Benjamin Horton Kendall, Shelby, and Miss Ruby Spratt were married in May.

DEATHS

Dr. Jacob H. Yount, Newton, aged 81, died April 1.

Dr. Aurelius L. Petree, Greensboro, aged 74, died April 16 of angina pectoris and myocarditis.

Continued on page 26

Hitherto: THREE WEEKS' treatment with quinine has been commonly required to eradicate all parasites from the blood of the malarial patient.

Now: FIVE DAYS' administration of Atabrine is sufficient to destroy the schizonts which produce the acute paroxysms and the gametocytes which transmit malaria through the mosquito.

Atabrine has none of the by-effects of quinine which so often interrupt treatment and interfere with the patient's occupation. Relapses are much less likely to occur.

Moreover, Atabrine is economical as only five days' medication is usually necessary in tertian and quartan malaria.

DOSAGE: Adults, one tablet three times daily for 5 successive days. Children, one-half to one tablet, once to thrice daily according to age.

Pamphlet containing detailed instructions will be sent to physicians on request.

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Continued from page 24

OKLAHOMA

Dr. LeRoy Downing Long, Oklahoma City, is the newly elected President of the Southern Society of Clinical Surgeons.

Dr. W. J. Wallace and Dr. A. M. Young, Oklahoma City, have opened offices in the Medical Arts Building, practice limited to urology.

Dr. George H. Kimball, Oklahoma City, has opened offices in the Ramsey Tower, practicing traumatic and plastic surgery.

Dr. Pat Fite, Muskogee, attended the meeting of the Southern Society of Clinical Surgeons at Boston in April.

Dr. Thomas M. Berry, Eldorado, has been appointed to succeed the late Dr. Dow Taylor as Superintendent of the Western Oklahoma Hospital at Supply.

The Tulsa County Medical Society held their annual spring golf tournament in April.

Deaths

Dr. John A. Jones, Tonkawa, aged 59, died April 19 of carcinoma.

Dr. James Fleming Musser, Calvin, aged 48, died April 17 from injuries received in an automobile accident.

Dr. Alexander H. Stewart, Lawton, aged 80, died April 10 of cerebral hemorrhage.

Dr. John Chisholm Breedlove, Muldrow, aged 49, died suddenly April 14 of heart disease.

Dr. Chauncey Centus Way, Muskogee, aged 56, died February 6 of lobar pneumonia.

Dr. Edgar Armistead Dulin, Bartlesville, aged 89, died April 7 of heart disease.

Dr. Dow Taylor, Supply, aged 59, died March 8 following a stroke of apoplexy.

SOUTH CAROLINA

The South Carolina Medical Association, at its recent annual meeting, elected the following officers for the coming year: Dr. William Egleston, Hartsville, President-Elect; and Dr. E. A. Hines, Seneca, reelected Secretary-Treasurer. Dr. R. E. Abel, Chester, is the incoming President.

Dr. Joseph I. Waring, Charleston, is the newly elected President of the South Carolina Pediatric Association.

Dr. Robert Wilson Ball, formerly Health Officer of Horry County, has been appointed to succeed Dr. John B. Setzler, Columbia, as Health Officer of Richland County.

Clinics in charge of a committee headed by Dr. G. T. Tyler, Greenville, were held at the various tuberculosis sanatoria in the State during the month of May for the purpose of providing short postgraduate courses to the profession.

Dr. Herbert Richardson Dove, Colonial Heights, and Miss Helen Turner were married in April.

Deaths

Dr. William Gadsden Gamble, Kingstree, aged 64, died April 5 of cerebral hemorrhage and intestinal obstruction.

Dr. Wiley L. Whitehead, Lake City, aged 59, died March 31 of injuries received in an automobile accident.

Dr. Joseph Sarvis Dusenbury, Conway, aged 66, died May 1 of pneumonia.

TENNESSEE

The West Tennessee Medical and Surgical Association met at Shiloh Park in May.

The Upper Cumberland Medical Society held its meeting at Red Boiling Springs in June.

Dr. Roy M. Lanier has returned to Brownsville, where he has opened offices.

Dr. J. S. Hawkins and Dr. W. Fyke, Springfield, have been elected President and Vice-President, respectively, of the Springfield Rotary Club.

Dr. Owen D. Moore, Knoxville, announces the opening of his offices in the Medical Arts Building.

The Middle Tennessee Medical Society held its meeting at Woodbury in May.

Dr. Gideon W. Stone and Miss Hannah Francis, both of Knoxville, were married in April.

Deaths

Dr Nathaniel M Lewis, Murfreesboro, aged 85, died March 26 of heart disease

Dr James Philip Hatfield, Wheat, aged 50, died April 7 of cerebral hemorrhage

Continued on page 28

An Endocrine Prescription in Dysmenorrhea and Amenorrhea

You can write an endocrine prescription in one word—a proper combination of the endocrine principles which are now known to initiate and control the menstrual process. Your prescription will have the advantage of being filled with fresh potent endocrine constituents. The formula is in accord with the most recent research on the endocrine glands concerned in regulating menstruation.

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When Babies are suffering from Diarrhea, Vomiting—Summer-Complaint caused by Hot Weather or Improper Feeding they require

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THIS can be accomplished only through a flexible food—one which will allow of a change in the percentages of its component parts—protein, fat, carbohydrate and water.

Diarrhea and vomiting both cause a loss of water to the system and dehydration is, without question, the most serious result of summer-complaint.

Babies cannot stand prolonged starvation. It is not how much they ingest, but how much they are able to digest and assimilate that determines the choice of food. "One of the great advantages of milk powders is the possibility of varying the relation between water, fat and other elements of the milk." (Porcher)

Dryco is the food of choice since it requires no refrigeration, is always fresh and ready for use, may be given in all degrees of concentrations and modifications—thereby allowing easy regulation of the quantity of water to be ingested for a given amount of protein, fat and carbohydrate.

Dryco Is Digested and Assimilated When Other Foods Fail

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ALL DRYCO IN THE HANDS OF DRUGGISTS IS IRRADIATED

Continued from page 26

Dr. Charles N. Cowden, Nashville, aged 69, died April 20.

TEXAS

The Tri-State Medical Association of Louisiana, Texas and Arkansas recently met at Marshall, Texas, and elected the following officers for the coming year: Dr. V. R. Hurst, Longview, Texas, President; Dr. R. G. Granbery, Marshall, Texas, Dr. J. D. Young, Shreveport, Louisiana, Dr. Albert Mann, Jr., Texarkana, Arkansas, Vice-Presidents; and Dr. George Patrick Quinn, Shreveport, Louisiana, Secretary-Treasurer.

Dr. J. S. McCelvy, Temple, Dr. S. A. Woodward, Fort Worth, and Dr. Henry F. Hein, San Antonio, were recently appointed by the Governor to the State Board of Health.

Dr. E. H. Cary, Dallas, has recently returned from Washington, where he went to attend the White House medical conference.

Dr. J. R. Mahone has been appointed to succeed Dr. W. E. Spivey, resigned, as Director of the Cameron County Health Unit.

Dr. William D. Gill, San Antonio, has been presented by the State of New York with a medal for conspicuous military service during the World War.

Dr. John H. Burleson and Dr. T. N. Goodson, San Antonio, have been named by the Bexar County Commissioners' Court as members of the Board of Managers for the Robert B. Green Hospital at San Antonio.

Dr. Austin F. Leach, Wichita Falls, is the newly elected President of the Wichita County Tuberculosis Association, and Dr. M. A. Beckman, Wichita Falls, was elected First Vice-President.

Dr. John O. McReynolds, Dallas, was recently elected President of the Pan-American Medical Association for a term of three years.

Dedication services of the U. S. Marine Hospital at Galveston were held in March, with Surgeon General Hugh S. Cumming, Washington, U. S. Public Health Service, presiding.

Deaths

Dr. W. A. Kimbrough, Haskell, aged 60, died April 3 of heart disease.

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Dr. John Joseph Smith, Dallas, aged 56, died March 21 of carcinoma of the thyroid.

Dr. Henry Burdick, Copperas Cove, aged 70, died March 31 of heart disease.

Dr. Alexander Wayne Holland, Dallas, aged 78, died April 2 as the result of injuries received in a fall.

Dr. James Daniel Currie, Hico, aged 61, died March 9 of pneumonia.

Dr. Clyde F. Johnson, Seymour, aged 63, died April 6 following an operation for appendicitis.

VIRGINIA

The eleventh Postgraduate Clinic was held at the University of Virginia Hospital in May with forty-eight physicians in attendance.

The Joint Committee on Prenatal and Postnatal Instructions has organized a new circuit of postgraduate classes which opened in May with centers in various points in the southwestern part of the State.

The Augusta County Medical Association met in Staunton in May for its regular quarterly session.

Dr. Robert Whitehead, Richmond, has moved into new offices at 5 East Franklin Street.

Dr. Hunter H. McGuire, Winchester, was recently reelected President of the Winchester Memorial Hospital for the thirty-second consecutive time. Dr. McGuire has held this office ever since the institution was established.

Dr. Rudolph C. Thomason announces the opening of offices in the Professional Building, Richmond, for the practice of ophthalmology.

The Graduate Nurses' Association of Virginia met in Richmond in May and elected the following officers for the coming year: Miss Blanche Webb, Norfolk, reelected President; Miss Frances Zeigler, Richmond, Miss Ruth Morton, Richmond, Vice-Presidents; Miss Mary Marshall, Hampton, Secretary; Mrs. Jessie W. Faris, Richmond, Treasurer; and Miss Nina Gage, Hampton, Director.

Dr. Wilmer Howard Paine, Jr., Charlottesville, and Miss Mildred Goadby Black were married in April.

Dr. Sigmund Newman, Vienna, and Miss Rita Lessner were married in May.

Deaths

Dr. J. Monroe Klinger, Harrisonburg, aged 83, died March 29 of heart disease.

Dr. Robert Allen Gamble, Petersburg, aged 59, died April 14 in an automobile accident.

Dr. Maury B. Linkous, Blacksburg, aged 59, died suddenly April 29.

Dr. Louis A. Thompson, Hampton, aged 60, died April 14.

Dr. Wesley Reid Putney, formerly of Farmville, aged 55, died suddenly May 2.

WEST VIRGINIA

The West Virginia Medical Association, at its recent annual meeting, elected the following officers for the coming year: Dr. Roy Benn Miller, Parkersburg, unanimously elected President; Dr. Albert G. Rutherford, Welch, first Vice-President; Dr. G. H. Barksdale, Charleston, Second Vice-President; and Dr. T. M. Barber, Charleston, Treasurer.

A committee met recently in Charleston with Dr. W. D. Stroud, Secretary of the American Heart Association, and organized the West Virginia Heart Association. The following officers were elected to serve for the coming year: Dr. Oscar B. Biern, Huntington, President; Dr. G. H. Barksdale, Charleston, Vice-President; and Dr. R. J. Condry, Elkins, Secretary-Treasurer.

The Wyoming County Medical Society has elected the following officers for the coming year: Dr. B. W. Steele, Mullens, President; Dr. T. W. Heironimus, Alpoca, Vice-President; and Dr. Ward Wylie, Mullens, reelected Secretary-Treasurer.

Dr. David Littlejohn, Charleston, has succeeded Dr. William T. Henshaw, resigned, as acting head of the State Health Department.

Dr. Ben W. Bird, Jr., Princeton, and Miss Lucile Dunlap were married in April.

Deaths

Dr. Julian D. Arbuckle, Lewisburg, aged 57, died May 3 of heart disease.

Dr. Louis T. Boyer, Hollidays Cove, aged 35, died May 1 in a Pittsburg hospital of recurrent agranulocytic angina.

Dr. Alonzo C. Vandine, Charleston, aged 61, died May 2, following an illness of influenza.

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When you prescribe Evaporated Milk for infant feeding, you have in mind a milk with certain qualities... wholesomeness, freshness and purity. But the bridge table "authorities" may not know which brand of milk measures up to your high standards.

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The Borden Company produces Evaporated Milks in which the physician will find the quality he demands for infant feeding. Careful selection of raw milk and rigid safeguards throughout manufacture guarantee the quality of every Borden brand...Borden's Evaporated Milk... Pearl... Maricopa... Oregon...St. Charles...Silver Cow. All are accepted by the American Medical Association.

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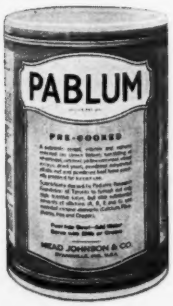

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PABLUM is unique among cereals. For it is not only richer than any others in a wider variety of vitamins and minerals but it is also the only precooked cereal which is dry-packed yet which can be served hot.

To prepare Pablum for the infant, all the mother need do is measure the prescribed amount directly into the cereal bowl and add boiled hot water, stirring with a fork. (Milk or water-and-milk of any temperature may be used for infants—cream for older children and adults.)

This ease of preparation makes Pablum especially welcome in families where the benefits of hot cereals are often denied simply because the process of cooking ordinary cereals is too long and too bothersome. As it is a dry cereal, Pablum keeps indefinitely and requires no refrigeration. Being dry, only cereal is paid for, not added water. This fact plus the manner in which it is prepared makes Pablum "economical, — no waste."

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Unlike many foods that are "good for growing children," Pablum *tastes good.*

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Relative Values of Carbohydrates

New Findings Confirm Old Truths

Recent scientific investigations in rats (tabulated at the right) are in accord with many years of clinical observations on babies, as shown by the following excerpts from authoritative medical literature reflecting the consensus of three decades of pediatric experience.

RELATIVE ASSIMILATION VALUES OF VARIOUS CARBOHYDRATES[1]

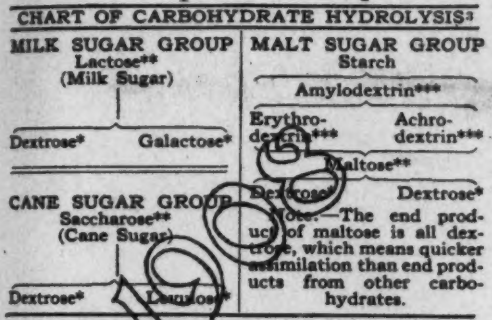
		Average per 100 gms. body weight
1	MALTOSE	1.50
2	DEXTRIN + MALTOSE	1.32
3	Glucose + dextrin	1.32
4	Glucose + sucrose	1.32
5	Glucose	1.04
6	Sucrose + maltose	0.98
7	Fructose + glucose	0.98
8	Sucrose + dextrin	0.76
9	Sucrose	0.76
10	Fructose	0.5
11	Glucose + lactose	0.26
12	Lactose	0.16
13	Galactose	0.1

These authors have also stated: "Maltose, fructose, glucose, starch and dextrin *lead* in nutritive value, *followed by* galactose, mannose, arabinose, xylose, lactose, sucrose and glycogen. [2]

1929

[1] H. Ariyama and K. Takahasi: *Biochem. Z.*, **216**:269 (1929) and [2] *J. Agr. Chem. Soc.*, Japan 5; 674 (1929).

CHART OF CARBOHYDRATE HYDROLYSIS[3]



1925

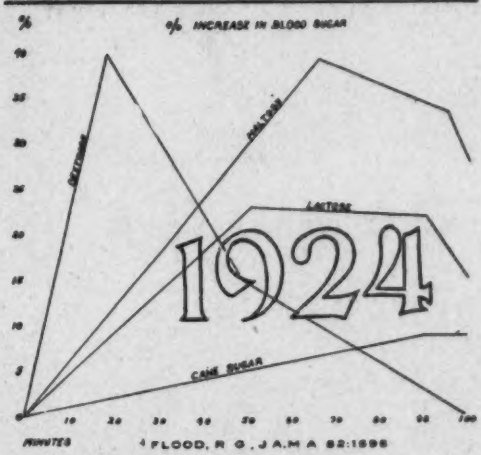
Note.—The end product of maltose is all dextrose, which means quicker assimilation than end products from other carbohydrates.

*Monosaccharide **Disaccharide ***Polysaccharide

Maltose splits into two molecules of dextrose. Sucrose and lactose split into one molecule of dextrose and one of levulose or galactose respectively. It is no doubt due to the simpler structure of maltose that it is more readily absorbed than other sugars. It must also be considered that after assimilation the levulose of sucrose and the galactose of lactose must undergo conversion into dextrose, which is the only form in which sugar is present in the blood. It is reasonable to suppose that this conversion requires an expenditure of metabolic energy not required when carbohydrate is absorbed entirely in the form of dextrose.

[3] Morse, J. L. & Talbot, F. B. *Boston Med. & Surg. Jl.*, **189**:852.

RATE OF SUGAR ABSORPTION IN NEWBORN[4]



1924

[4] FLOOD, R. G. J.A.M.A. 82:1696

MALTOSE OR LACTOSE IN INFANT FEEDING[5]

Answer—The superiority of one form of carbohydrate over another in artificial feeding of infants has been much discussed during recent years. It is generally accepted that cow's milk without modification is not a satisfactory infant food. So far as the carbohydrate is concerned, about one-fifth to one-eighth ounce per pound of infant's body weight is required daily. To supply this amount it is necessary to add carbohydrates in some form. Admitting that lactose is the sugar supplied in human milk, it does not follow that it is the sugar best tolerated in another medium, such as cow's milk. It is generally believed that lactose is more laxative than sucrose—that it must be fed with a certain amount of caution, as fermentative upsets are likely to follow if amounts approximating that found in human milk are fed. There is cause for disagreement among clinicians, as it is important to consider the other food elements; i.e., the amounts of fat and protein fed as well as the medium in which they are fed. For example, when lactic acid milk is used, more added carbohydrate seems to be tolerated than when sweet milk mixtures are fed. Sucrose has the advantage of being much cheaper and is always available. Evidence has not been presented that it should not be used in infant feeding. With its general use in large infant welfare clinics where supervision is a matter of routine, there is less to be said against it as far as clinical results are concerned. The complaint that it is too sweet is not often encountered when the usual amounts are fed. The dextrin-maltose preparations possess certain advantages. When they are added to cow's milk mixtures, we have a combination of three forms of carbohydrates, lactose, dextrin and maltose, all having different reactions in the intestinal tract and different absorption rates. Because of the relatively slower conversion of dextrins to maltose and then to dextrose, fermentative processes are less likely to develop. Those preparations containing relatively more maltose are more laxative than those containing a higher percentage of dextrin (unless alkali salts such as potassium salts are added). It is common experience clinically that larger amounts of dextrin-maltose preparations may be fed as compared with the simple sugars. Obviously, when there is a lessened sugar tolerance such as occurs in many digestive disturbances, dextrin-maltose compounds may be used to advantage. [5] *Queries and Minor Notes, J. A. M. A.*, 88:266.

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